2004 FIVE-YEAR REVIEW
Revision: 2

CARRIER AIR CONDITIONING SITE
COLLIERVILLE, TENNESSEE

Appendices B through S

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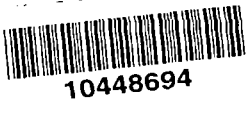
June 2005



Appendix B
Scope of Work:
Reconstruction of Main Plant Area Remedial System (XDD, August 2004)

SCOPE OF WORK
RECONSTRUCTION OF MAIN PLANT AREA REMEDIAL SYSTEM

Carrier Air Conditioning Superfund Site
Collierville, Tennessee
EPA ID: TND04406222

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AUGUST 18, 2004

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1.0 INTRODUCTION

On behalf of Carrier and United Technologies Corporation (UTC), Xpert Design and Diagnostics, LLC (XDD) has prepared the following scope of work (SOW) for the reconstruction of the Main Plan Area (MPA) remediation system at the Carrier Air Conditioning Superfund Site located at 97 South Byhalia Road in Collierville, TN (site). The existing remediation system at the MPA consists of a soil vapor extraction (SVE) system, and is a component of the remedy selected by the United States Environmental Protection Agency (USEPA), as discussed in the Record of Decision (ROD), dated September 3, 1992. A 300,000 square foot expansion to the current Carrier plant is planned with construction to start in August, 2004. The planned expansion area overlies the existing MPA SVE system. The planned expansion of the plant will require excavation and demolition of existing below ground and above ground structures, including the MPA SVE system. In order to remain in compliance with the ROD for the site, reconstruction and continued operation of the MPA remediation system is necessary.

Based on the most recent remedial investigations (2002 and 2004), the vadose zone soils in the MPA source area still contain trichloroethylene (TCE) concentration levels higher than the ROD cleanup criteria of 533 ug/Kg. The reconstruction of the MPA remediation system will continue the removal of chemicals of concerns (COCs), primarily TCE mass, from the impacted soils. The MPA SVE system will be reconstructed in accordance with the site-specific design criteria developed for the existing remediation system (as presented in Final MPA SVE Design Report, dated September 22, 1994). The reconstructed MPA SVE system will focus on remediating the areas that were targeted by the original MPA SVE system, and will expand the remediation into the areas of TCE exceedance (TCE exceeding 533 ug/Kg) identified by the most recent investigations (2002 and 2004) in the area of the plant expansion building. A subslab ventilation system is also proposed to be constructed as a protective measure, in the event the migration of the subslab COC vapors to the plant expansion building becomes an issue in the future.

As required by USEPA and the Tennessee Department of Environmental Conservation (TDEC) in their July 22, 2004 meeting with Carrier representatives, the scope of work for the abandonment of the existing MPA SVE system and the reconstruction of the MPA SVE system must be submitted and approved prior to the start-up of abandonment and reconstruction activities. This document includes the scope of work for the abandonment of the existing MPA SVE system, reconstruction of the MPA SVE system, and installation of the subslab ventilation system. The design drawings with general specifications of the SVE and the subslab ventilation system wells, manifolding, wellheads, equipment, and instrumentation are included. Minor installation modifications to compensate for interferences and structural obstructions of the proposed plant expansion may occur during the reconstruction; construction as-builts will be included in the Remedial Action Report to be submitted to the USEPA on completion of the reconstruction. This SOW also contains an overview of the design basis/conceptual design of the reconstructed MPA remediation SVE system. The design basis/conceptual design of the reconstructed MPA remediation SVE system and the most recent soil sampling results at the

MPA will be discussed in detail in the Five-Year Review Report for the Carrier Air Conditioning Superfund Site (to be submitted to EPA in September, 2004).

It is important to note that only those additional areas of TCE exceedance located under the plant expansion building are addressed in this SOW; to the extent necessary, areas of TCE exceedance beyond the footprint of the plant expansion will be addressed in a future SOW.

2.0 SITE BACKGROUND INFORMATION

A site location and vicinity map is provided in Figure 1. The MPA is located along the southern edge of the main plant building. The immediate site surface is primarily concrete and asphalt above industrial fill. Underlying the MPA fill material is mostly clay silts and silty clays to varying degrees up to 30 feet below ground surface (BGS) or below existing grade. This material is underlain by fine to medium grained sands to about 40 feet BGS, where the Jackson formation begins. The soils are representative of the loess depositions that are generally associated with alluvial plains surrounding the Mississippi River. Below the Jackson formation is the Memphis Sand Aquifer. Between 40 and 60 feet BGS is the Jackson/Upper Claiborne Formation, above which a perched, non-potable groundwater source (intermittent shallow aquifer) has been documented. The MPA geologic information is presented in Figure 4.

Volatile organic compounds (VOCs), specifically TCE, have impacted soil and groundwater in two primary areas of the 135-acre property, the MPA and the North Remediation System (NRS) area. Historical releases triggered a chain of regulatory events resulting in the placement of the site on the USEPA Superfund National Priorities List, Region 4 in 1990, and a Unilateral Administrative Order on Consent being issued to Carrier on February 11, 1993. The ROD identified the following COCs for soil at the site: TCE, dichloroethene (DCE), vinyl chloride, tetrachloroethylene (PCE), dichloroethane (DCA), lead, and zinc. Two releases of TCE occurred in the MPA: the 1979 spill involving 2,000 to 5,000 gallons, and the 1985 spill of an unknown volume (greater than 500 gallons). Remediation in the MPA consisted of limited soil excavation and installation of the soil vapor extraction system.

The MPA SVE system was implemented in 1995 in an effort to address the TCE and other VOCs remaining in the MPA source area. The MPA SVE system is comprised of seven vertical wells and two horizontal wells. The location of the existing MPA SVE wells is shown in Figure 2. The construction details of the existing MPA SVE system and its comparison with the proposed SVE system are provided in Section 4.0 of this SOW. Soil sampling was performed in 2002 using the EnCore® Method, as recommended in SW 846 Method 5035A, in order to determine the effectiveness of remediation activities. This soils investigation indicated that MPA source area soils still contain TCE concentration levels higher than the ROD clean-up criteria of 533 ug/Kg. In April of 2004, soil sampling was performed using the EnCore® Method to delineate and quantify the COCs in the soil in order to develop an estimate of the TCE impacted soil volume that would be encountered during the plant expansion. The results of the 2004 soil sampling and analysis indicate that the unsaturated soils in the MPA still contain concentration levels higher than the ROD clean-up criteria of 533 ug/Kg. The aerial extent of soils containing TCE exceeding the 533 ug/Kg criteria (based on 2004 soil sampling data) for two vertical

intervals (0 to 6 and 6 to 20 feet BGS) is presented in Figure 2. Figure 2 also indicates the area with soils exceeding 533 ug/Kg (TCE) criteria based on 2002 soil sampling data.

3.0 DESIGN BASIS AND TECHNICAL APPROACH

3.1 EXISTING AND RECONSTRUCTED MPA SYSTEM CAPACITIES

The reconstructed MPA system will have the capacity to address a greater area than the existing MPA system. The current shallow SVE system operates from six vertical wells (screen interval of 5 to 20 feet BGS) and two horizontal wells (screen depth of 2.5 feet BGS) with a design radius of influence of 20 feet. The reconstructed shallow and deep (combined screen interval of 3.5 to 23.5 feet BGS) well SVE system will operate on 49 multilevel, (some of them multilevel and nested within the same borehole) vertical wells, with the same design radius of influence of 20 feet. The operating areas for the current shallow and reconstructed shallow and deep well SVE systems are approximately 15,536 and 61,544 square feet, respectively.

The current deep sand well (screen interval of 30 to 40 feet BGS) SVE system operates from one vertical well with a design radius of influence of 100 feet. The reconstructed deep sand well (screen interval of 30 to 40 feet BGS) SVE system will operate on three vertical wells, with the same design radius of influence of 100 feet. The operating areas for the current and reconstructed deep sand well SVE systems are approximately 31,400 and 94,200 square feet, respectively.

The maximum flow rates for the current and reconstructed SVE systems are 240 and 550 CFM, respectively. The reconstructed MPA system will have a greater total flow rate than the existing MPA system. The reconstructed MPA remediation SVE system design basis will be presented in detail in the Five-Year Review Report.

3.2 DESIGN BASIS

As stated previously, the planned expansion of the plant will result in the demolition of the existing MPA remediation system. Reconstruction and continued operation of the MPA SVE system will provide a continued treatment of the MPA source soils, to ensure on-going compliance with ROD. The proposed SVE system design incorporates the use of volatile organic vapor extraction from unsaturated soils from an array of depth-specific extraction wells in the MPA. The goal of the reconstructed MPA SVE system is to remove and prevent migration of contaminants from soil to groundwater that would result in Memphis Sand aquifer contamination in excess of Maximum Contaminant Levels (MCLs) and Applicable or Relevant and Appropriate Requirements (ARARs), in accordance with ROD.

The proposed SVE well layout consists of a total 49 multilevel well locations, approximately 40 feet on-center (20-feet radius of influence [ROI], in accordance with the Final MPA SVE Design Report, and the ROD). The proposed SVE well layout is presented in Figure 3. A cross-section

of the site showing the MPA geologic information and the general relationship between proposed SVE well screen intervals and the contaminant distribution is presented in Figure 4. The locations, screen intervals, and number of vapor extraction wells are based upon the horizontal and vertical extent of contamination (as presented in Figures 2 and 4), and the area of influence produced by each extraction well.

The proposed SVE system emulates the existing MPA SVE design. The site-specific design criteria of the existing MPA SVE system, as developed by Parameter Evaluation Tests (PET's) (December 1993) and presented in the Final MPA SVE Design Report, are used as the design basis for the proposed SVE system. The conceptual design parameters for the reconstructed SVE system, such as air permeability of the soils and ROI of the extraction wells, are consistent with the Final MPA SVE Design Report, the ROD, and the August 28, 2000 EPA Five-Year Review Report. Design flows and vacuums at individual wellheads are based on the Final MPA Design Report and the performance data of the existing MPA SVE system.

The design basis for the proposed subslab ventilation system is to prevent potential vapor intrusion into the proposed expansion building. The subslab ventilation system design incorporates the use of a negative vacuum (vacuum greater than the design HVAC vacuum in the expansion building: 0.10 inches of water) beneath the expansion building via a network of horizontal well screens. The applied negative vacuum beneath the expansion building floor slab will prevent the accumulation of the COC vapors beneath the slab of in the pore space of the backfill material (i.e., crushed limestone), and thereby preventing the migration of the COC vapors into the expansion building.

4.0 SCOPE OF WORK

The scope of work includes three (3) major tasks as listed below:

Task 1 – Existing MPA SVE System Abandonment
- a. Vertical SVE Well and Monitoring Well Abandonment
- b. Horizontal SVE Well and Subsurface Manifold Removal
- c. SVE Equipment Building and Equipment Removal

Task 2 – MPA SVE System Reconstruction
- a. Well Installation
- b. Manifold Construction
- c. Process Equipment Fabrication and Equipment Building Construction

Task 3 – Subslab Ventilation System Construction
- a. Horizontal Well and Branch Manifold Construction
- b. Overhead Manifold Construction
- c. Equipment Fabrication

As-built construction drawings, specifications, operating parameters, complete Operation, Maintenance, and Monitoring (OMM) plans, and the details of the start-up activities will be

provided as part of the Remedial Action Report that will be submitted to EPA following construction completion. The above tasks are discussed in detail in the following sections.

4.1 TASK 1 - EXISTING MPA SVE SYSTEM ABANDONMENT

The abandonment of the existing MPA SVE system will include the following:

4.1.1 Vertical SVE Well and Monitoring Well Abandonment

All existing MPA SVE wells will be abandoned. Well abandonment will be performed in accordance with the standard procedures and guidelines set by the Memphis and Shelby County Health Department (MSCHD).

The location of the existing MPA SVE wells is shown in Figure 2. The existing MPA SVE system includes six shallow (20 feet BGS) wells and one deep (40 feet BGS) well. Each vertical SVE well is constructed of 2-inch Schedule (SCH) 40 polyvinyl chloride (PVC) piping, with 15-feet of 0.010-inch slotted well screen.

In addition to the existing MPA SVE wells, two groundwater monitoring wells (located within the footprint of plant expansion), MW-6 and MW-1B, will also be abandoned using the standard procedures and MSCHD guidelines.

4.1.2 Horizontal SVE Well and Subsurface Manifold Removal

All subsurface manifold piping from the vertical SVE wellhead to the equipment building will be completely removed by excavation. In addition, two horizontal SVE wells constructed of 2-inch, 0.010-inch slotted well screen will be removed by excavation. Pipe trenches will be backfilled with native materials and/or engineered backfill as appropriate.

4.1.3 SVE Equipment Building and Equipment Removal

Existing MPA SVE system equipment and process instrumentation including blowers, air-moisture separator, and activated carbon units will be disconnected and removed from the existing Equipment Building. The removed equipment and process instrumentation may be utilized for the reconstructed MPA SVE system. The existing equipment building will be demolished by a licensed and experienced demolition subcontractor in accordance with all local requirements.

4.2 TASK 2 - MPA SVE SYSTEM RECONSTRUCTION

The MPA SVE system reconstruction consists of:

- Installation of multi-level SVE wells,
- Construction of subslab and overhead piping manifold,
- Fabrication of process equipment/instrumentation, and
- Construction of a new Equipment Building.

The proposed SVE well layout is shown in Figure 3, and consists of 49 nested well locations. For more versatile operation and to maximize the system performance, the vapor extraction wells will target three discrete vertical intervals. These targeted intervals were delineated using geologic and contaminant distribution information shown on Figure 4. The three vertical treatment intervals include:

- Shallow Zone: Clayey silts, 3.5 to 8.5 feet BGS [below existing grade]
  (Based on the contaminant distribution information, this zone contains the majority of contaminant mass.)
- Deep Zone: Clayey silts, 13.5 to 23.5 feet BGS
- Deep Sand Zone: Fine to medium sands, 30 to 40 feet BGS

All well depths shown in this SOW use existing grade as the reference datum. Construction activities will require approximately one (1) to three (3) feet of fill material in the MPA area. Final well depths will reference the expansion building finished floor, and all well installations will account for fill material.

4.2.1 Well Installation

Nested vapor extraction wells will be installed in the target area on an approximately 40 feet on-center spacing. A total of 44 shallow wells (screened at an interval of 3.5 to 8.5 feet BGS [below existing grade]), 49 deep wells (screened at an interval of 13.5 to 23.5 feet BGS), and 3 deep sand wells (screened at an interval of 30 to 40 feet BGS) will be installed. The construction details of the vapor extraction wells are presented in Figure 5 (Shallow and Deep nested SVE wells) and Figure 6 (Deep Sand SVE wells). The wells will be installed as follows:

- Shallow wells will be constructed with a 5-feet well screen.
- Deep and Deep Sand wells will be constructed with a 10-feet screen.
- Wells will be constructed of 2-inch SCH 40 PVC piping, with 0.020-inch slotted well screen and riser pipe.
- The surface completion of the wells will consist of 1-foot diameter or square water tight steel flush mount road box set in the proposed floor slab of the expansion building.
- All wells will be finished below grade.
- Individual well controls will be located at valve bank locations.

The SVE well proposed depths given in this SOW are approximate and are subject to change. The actual well depths will depend on subsurface conditions in the target areas and will be adjusted by the XDD field engineer. All SVE wells will be installed by a Tennessee licensed driller using standard hollow stem auger (HSA) techniques. Soil cuttings will be drummed and staged on-site for disposal.

4.2.2 Manifold Construction

In general, the SVE manifold will include two overhead main manifold lines (i.e., located in the ceiling trusses), and individual lateral lines from each SVE well head to the main lines. Shallow SVE wells will be connected to one overhead main line, and the Deep and Deep Sand SVE wells will be connected to the second overhead main line. This will allow multi-level wells to be operated with different vacuum regimes for optimal system performance.

A typical SVE well lateral manifold side view is shown in Figure 7. As shown in the figure, each SVE well head is connected to the main manifold via a subsurface lateral pipe section that routes to a nearby structural upright. The subsurface piping then runs vertically up the structural upright through a series of valves and sampling ports prior to connecting with the main line. The vertical manifold section is protected by a steel pipe. The general SVE system manifold layout is presented in Figure 8.

Manifold specifications can be summarized as follows:

- All well head lateral lines will be installed below the expansion building floor slab. Branch line piping will be installed in trenches dug to the nearest column.
- All lateral lines will be constructed of 2-inch SCH 40 PVC piping.
- Each well head will have separate well head controls (i.e., sample port and gate valve, as shown in Figure 7).
- Approximately four (4) to seven (7) individual SVE wells will be stubbed out at a single structural column and will be protected by steel riser pipe(s) (as shown in Figure 7). This design also consolidates the controls for several wells at one valve bank location.
- Overhead main line will connect the valve banks to the Equipment Building to connect to the appropriate skids.
- Main lines will be constructed of 6-inch SCH 40 PVC piping.

The two overhead main extraction lines will be routed to the new Equipment Building. Process instrumentation and equipment such as a high vacuum blower(s), air-moisture separator, activated carbon units, in-line particulate filter, and control panel will be housed on-site in the Equipment Building. A summary of the SVE system design is presented in Table 2.

4.2.3 Equipment Fabrication and Equipment Building Construction

The major components of the SVE equipment are shown in the Process and Instrumentation Diagram (P&ID), presented in Figure 9. Final sizing of the SVE equipment will be determined from field testing of the new SVE wells. Two separate soil vapor streams from the extraction well network (one from shallow and one from deep/deep sand wells) will be routed separately through separate SVE equipment skids that include air-moisture separators, particulate filters, and vacuum blowers. The two separate process flows discharged from the vacuum blowers will be combined into a single stream and be routed through a heat exchanger unit and vapor phase activated carbon units.

The two separate condensate water streams from air-moisture separators (one from shallow and one from deep/deep sand wells) will be routed through separate transfer pumps and will be combined for treatment through liquid-phase activated carbon units. In addition to these major system components, the proposed SVE system design will contain several in-line flow meters, vacuum gauges, temperature indicators, and valves for system monitoring and optimization as indicated by Figure 9. All process instrumentation and equipment will be installed in the Equipment Building.

The functions and general specifications of the major components of the process equipment and the conceptual operation parameters are briefly discussed in the following. The specification and conceptual operating parameters are subject to change based on the actual field conditions.

Air-Moisture Separator System

The vapor extraction configuration requires air-moisture separator to remove entrained water from the air stream before it enters the vacuum blower. The air-moisture separator system will consist of the following:

- Air-Moisture Separators (2) – Adequate volume capacity, 3-switch float control
- Transfer Pumps (2) – Centrifugal pumps
- Liquid-Phase Activated Carbon Unit
- Control Panel with Cellular Telemetry System – Control panel provides control for the transfer pumps and other components using separator level switches. Remote telemetry system monitors system shut-down and forward alarm.

The treated water by the liquid-phase activated carbon unit will be discharged to the sanitary sewer system under a modified discharge permit (to be obtained).

Vacuum Blower

Two separate vacuum blowers will be used for the shallow and the deep/deep sand vapor extraction wells. Each blower will be a high vacuum positive displacement blower, capable of providing approximately 200 to 300 CFM at 120 to 150 inches of H_2O.

In-Line Air Particulate Filter

A high efficiency particulate air filter will be used (for each soil vapor stream) at the blower downstream to remove fine particle solids.

Vacuum Relief Valve

A vacuum relief valve will be installed (for each soil vapor stream) to prevent excessive system vacuum.

Air Intake Gate Valve

A filtered air intake gate valve at the blower downstream will be provided (for each soil vapor stream). The gate valve will be positioned to regulate the amount of make-up air that is fed into the system.

Heat Exchanger

A heat exchanger unit will be used before the vapor-phase activated carbon unit to control air stream temperature prior to carbon treatment.

Vapor-Phase Activated Carbon Unit

The air stream will be treated through the two vapor-phase activated carbon units (installed in series) appropriately designed to handle the system total flow. Vacuum gauges and sample ports located upstream, between, and downstream of the carbon units will be installed to monitor pressure drop across the units and to collected pre-carbon, mid-carbon, and post-carbon vapor samples, respectively.

Equipment Building

The Equipment Building will be constructed at the southern wall of the plant expansion building, as shown in Figure 8.

Conceptual Operation Parameters and Control Panel

The SVE system will be designed to extract vapors at approximately 8 to 10 SCFM (at 50 to 80 inches of H_2O), 10 to 12 SCFM (at 50 to 80 inches of H_2O), and > 15 SCFM (at 40 to 60 inches of H_2O) from the shallow, the deep, and the deep sand extraction wells, respectively.

Two separate SVE Control Panels (for Shallow and Deep/Deep Sand systems, respectively) will be housed in the Equipment Building. A Programmable Logic Controller (PLC) will be used to control system operation. An auto-dialer telemetry system will be included to notify operators of alarm conditions (i.e., system shut down).

4.3 TASK 3 - SUBSLAB VENTILATION SYSTEM CONSTRUCTION

The proposed subslab ventilation system layout is presented in Figure 10. The subslab ventilation system construction will consist of installation of horizontal wells, branch and main manifolding installation, and equipment fabrication. The subslab ventilation system layout consists of a main line, five branch lines (legs), and 39 horizontal screens on 100-feet on-center spacing. The horizontal well screens will be piped to the branch lines (sub-slab) via laterals. The branch lines will be stubbed out of the floor slab adjacent to the expansion building southern wall and connected to the main overhead line. The main overhead line will be connected to the process equipment in the Equipment Building. A summary of the proposed subslab ventilation system design is presented in Table 2.

The conceptual operating parameters and the general specifications of the subslab ventilation system equipment provided in this SOW may change based on the actual field conditions. The subslab ventilation engineering design may also be modified to compensate for the interferences and structural obstructions of the proposed plant expansion.

4.3.1 Horizontal Well and Branch Manifold Construction

The typical subslab ventilation well screen and branch manifolding side view is shown in Figure 11. The horizontal wells and the branch manifold will be installed below floor slab in trenches.

The horizontal well and branch manifolding will be installed as follows:

- Horizontal wells will be constructed of 50-feet long well screens.
- Each well will be constructed of 2-inch SCH 40 PVC piping, with 0.010-inch slotted well screen.
- Horizontal well screens will be installed in the fill material at an approximate depth of 2 feet below the bottom of the proposed floor slab.
- Wells be installed with a 6-inch (minimum) sand pack around the well screen.
- All branch lines will be constructed of 4-inch SCH 40 PVC piping.
- Branch line trenches will be routed to the southern wall of the expansion building. The piping will then be routed up and stubbed-out through the slab adjacent to the southern wall of the expansion building and connected to a main overhead line. Individual legs (branch lines) will be controlled separately at valve bank locations.

4.3.2 Overhead Manifold Construction

The subslab ventilation branch line transition to the overhead main line is shown in Figure 12. Subslab ventilation system main overhead line will connect the valve banks to the appropriate skid in the equipment building. Main lines will be constructed of 6-inch SCH 40 PVC piping.

4.3.3 Equipment Fabrication

The designed system total flow rate is approximately 100 to 150 SCFM. The design flow rate per well screen is 2.5 to 4 SCFM and the required vacuum at the well screen is estimated at approximately 3 to 7 inches of H_2O.

The subslab system process equipment is shown on the Process and Instrumentation Diagram (P&ID) presented in Figure 9. All process instrumentation and equipment will be installed in the SVE Equipment Building. In general, the subslab ventilation process equipment will consist of a low vacuum blower, a particulate filter, a vacuum relief valve, and an air intake gate valve.

5.0 REPORTING

A Remedial Action Report summarizing the activities associated with the abandonment of the existing MPA SVE system and the reconstruction of the MPA SVE system (i.e., system

fabrication, construction, and well installation) will be prepared and submitted at the completion of the work described in this SOW.

6.0 PROJECT SCHEDULE

The anticipated project schedule is provided by task below.

Task	Sub-Task	Duration	Anticipated Completion Date/Month*
	Construction Schedule		
Task 1 – Existing MPA Soil Vapor Extraction (SVE) System Abandonment	Task 1a – Vertical SVE Well and Monitoring Well Abandonment	3 days	November, 2004
	Task 1b – Horizontal SVE Well and Subsurface Manifold Removal	3 days	November, 2004
	Task 1c – SVE Equipment Building and Equipment Removal	2 weeks	December, 2004
Task 2 – MPA SVE System Reconstruction	Task 2a – Well Installation	3 weeks	December, 2004
	Task 2b – Manifold Construction	5 weeks	February, 2005
	Task 2c – Process Equipment Fabrication and Equipment Building Construction	7 weeks	March, 2005
Task 3 – Subslab Ventilation System Construction	Task 3a – Horizontal Well and Branch Manifold Construction	4 weeks	January, 2005
	Task 3b – Overhead Manifold Construction	2 weeks	February, 2005
	Task 3c – Equipment Fabrication	4 weeks	March, 2005

*Note: The anticipated completion date/month provided in the schedule are subject to change based on the actual schedule of the plant expansion construction work.

7.0 REFERENCES

Baehr, A.L., Welty, C., and Joss, C.J. 1994. AIR3D: A Three Dimensional Model of Air Flow in the Unsaturated Zone – Version 1.0. American Petroleum Institute (API) Publication #4594.

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EPA SW 846 - Method 5035A – Closed System Purge and Trap and Extraction for Volatile Organics in Soil and Waste Samples. (Draft Revision 1). July 2002.

Final MPA SVE Design Report "Soil Vapor Extraction - Carrier Air Conditioning Site - Main Plant Area" by Environmental and Safety Designs, Inc. dated September 22, 1994.

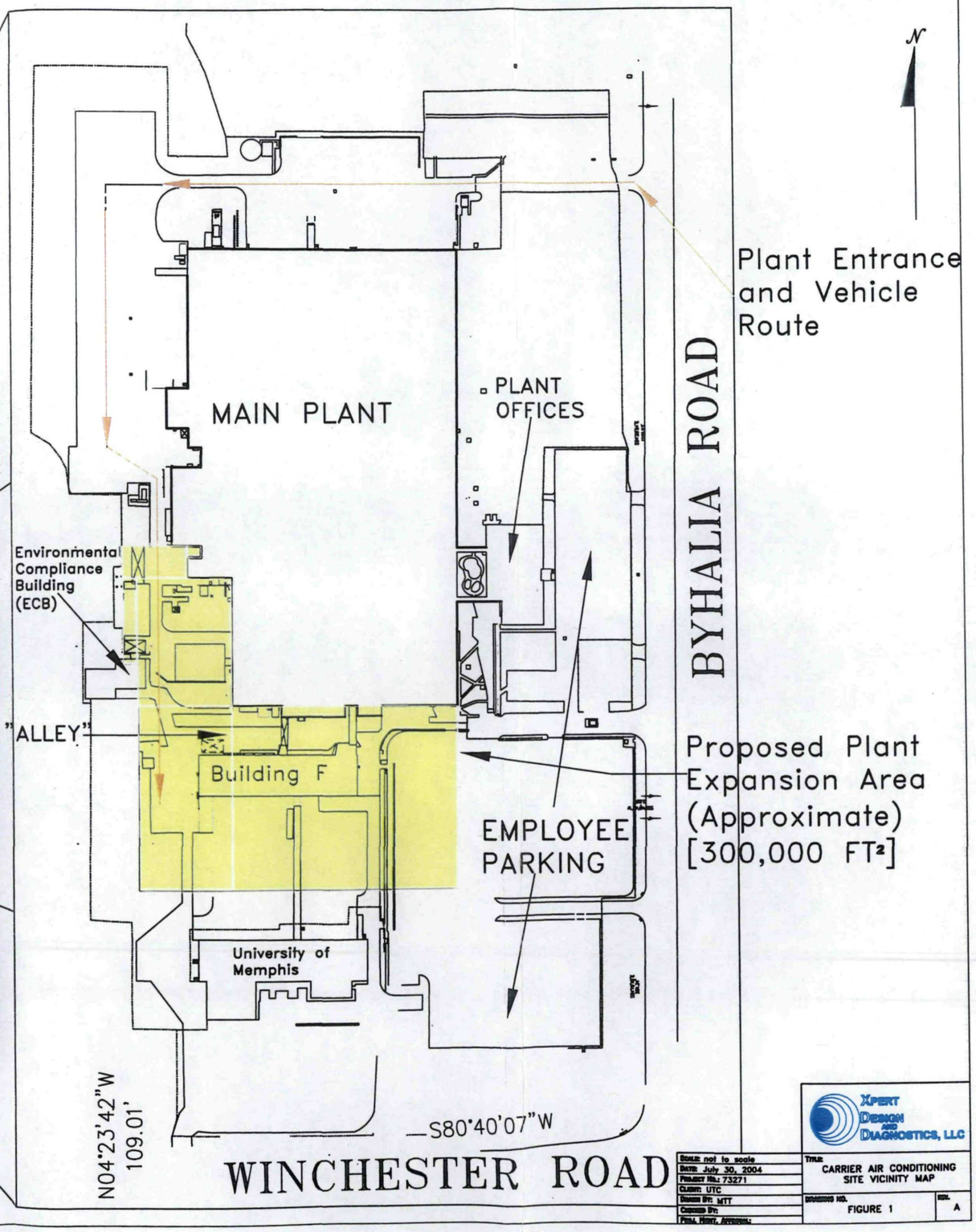
Record of Decision (ROD), Carrier Air Conditioning Site, by USEPA dated September 3, 1992.

Statement of Work (SOW) for Remedial Design and Remedial Action (RD/RA) Unilateral Administrative Order dated February 11, 1993, for Carrier Air Conditioning Site, by USEPA.

Well Abandonment Guidelines by the Memphis and Shelby County Health Department (MSCHD), Tennessee.

2002 – 2003 Annual Progress Report, UTC - Carrier Air Conditioning Site, by EnSafe Inc., Dated June 30, 2004.

FIGURES



XPERT DESIGN AND DIAGNOSTICS, LLC

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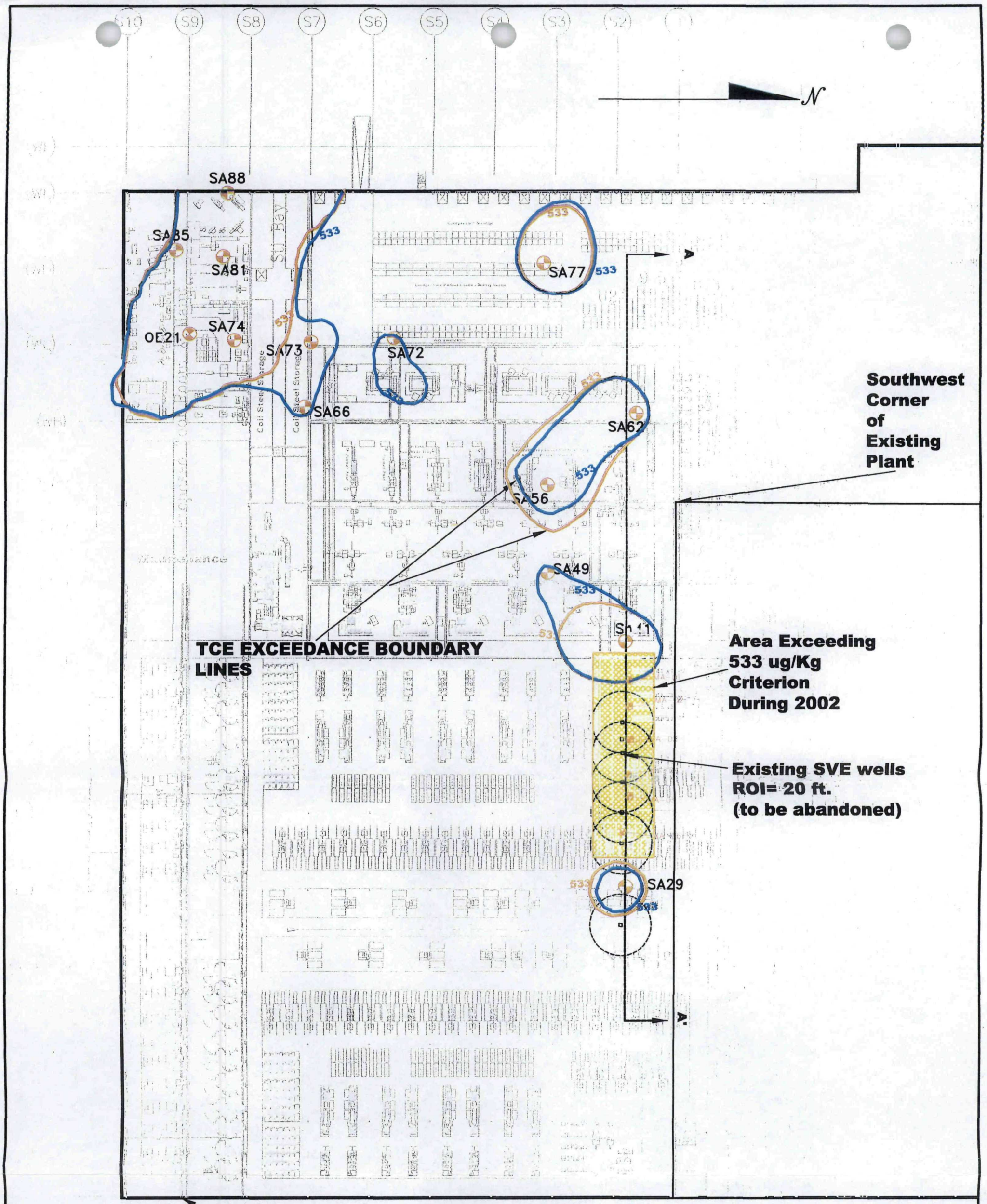
CHECKED BY:	REV. A
FINAL APPROV. APPROVAL:	



LEGEND

- Geoprobe Point > 533 ug/Kg TCE (2004)
- TCE 533 ug/Kg Contour Line 0 – 6 FT BGS (2004)
- TCE 533 ug/Kg Contour Line 6 – 20 FT BGS (2004)
- Area of Influence of existing MPA SVE system
- Borings from 2002 soil sampling data

NOTES ROI = Radius of Influence

GRAPHIC SCALE

0 30 60 120

1 inch = 60 ft.

XPERT DESIGN AND DIAGNOSTICS, LLC

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DATE: JULY 20, 2004	
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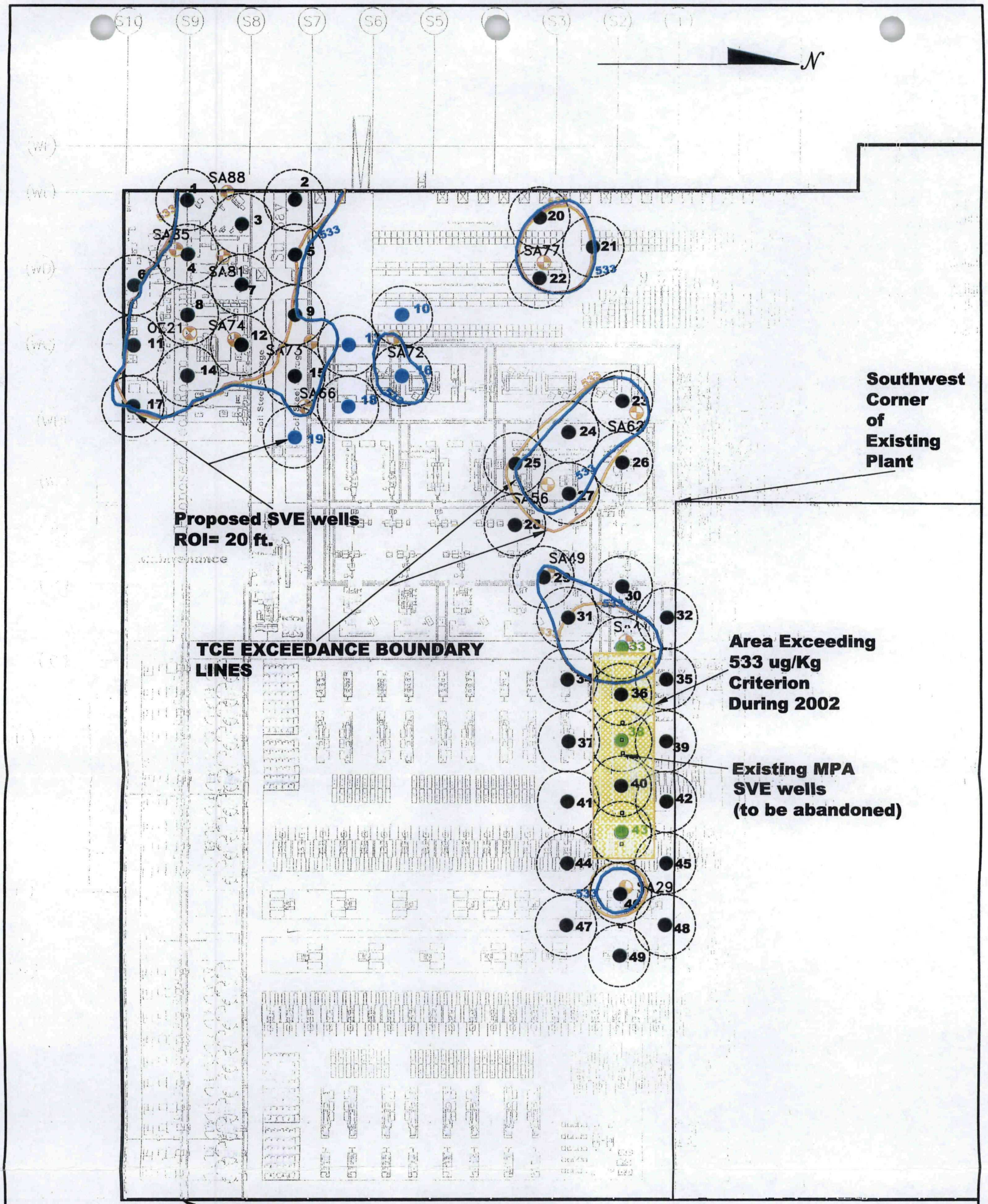


LEGEND

- Geoprobe Point > 533 ug/Kg TCE (2004)
- TCE 533 ug/Kg Contour Line 0 – 6 FT BGS (2004)
- TCE 533 ug/Kg Contour Line 6 – 20 FT BGS (2004)
- Proposed Multilevel Soil Vapor Extraction Wells (Shallow, Deep, and Deep Sand)
- Proposed Dual Level Soil Vapor Extraction Wells (Shallow and Deep)
- Proposed Single Level Soil Vapor Extraction Well (Deep)
- Area of influence of proposed MPA SVE system

NOTES Soil Vapor Extraction Wells are generally spaced (</=) 40 feet on center.
ROI = Radius of Influence

GRAPHIC SCALE

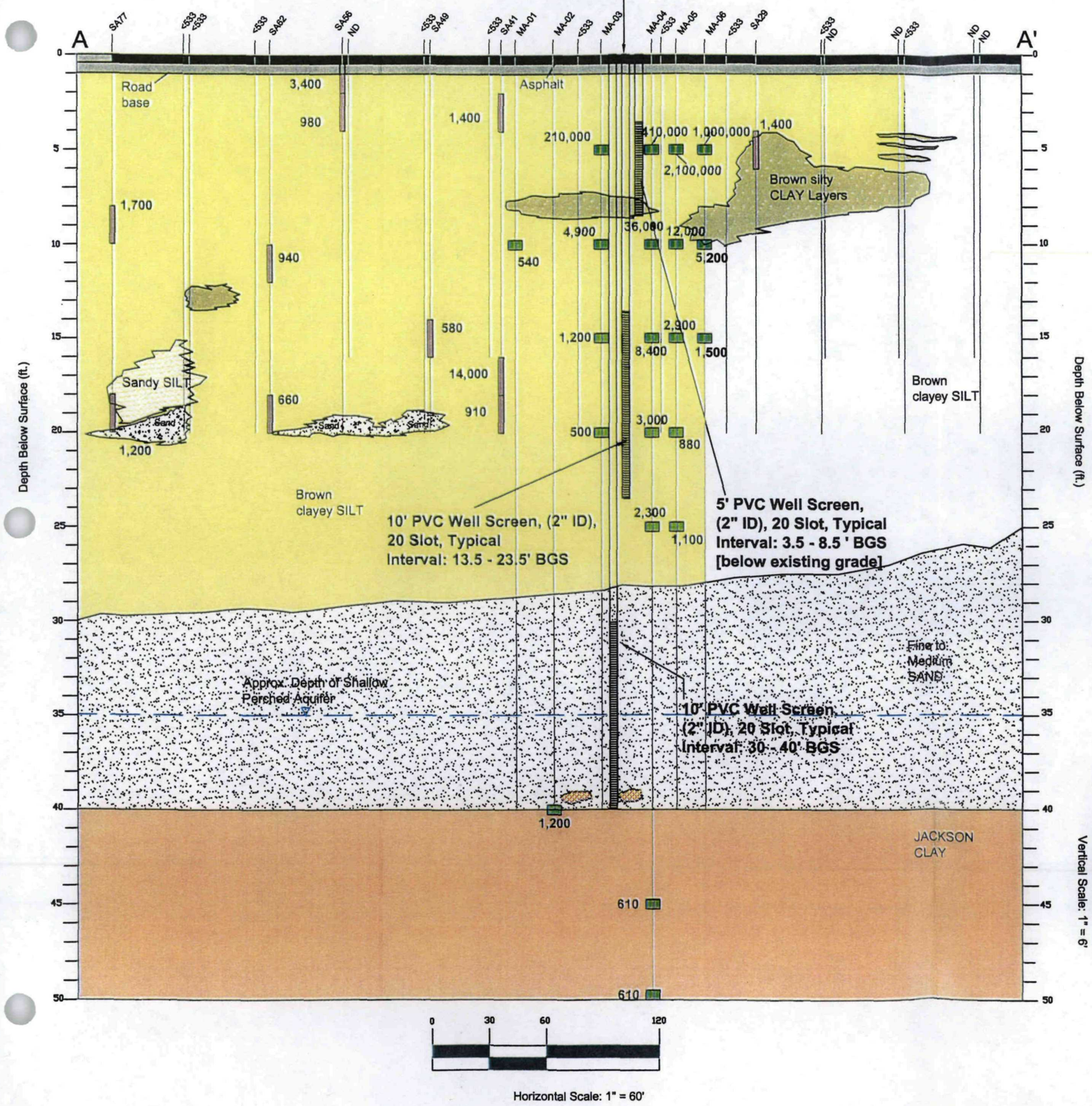
0 30 60 120

1 inch = 60 ft.

XPERT DESIGN AND DIAGNOSTICS, LLC

SCALE: As shown	TITLE: SVE TREATMENT AREAS – MPA UTC – Carrier Air Conditioning Collierville, TN
DATE: JULY 20, 2004	
PROJECT No.: 73271	
CLIENT: UTC – COLLIERVILLE	
DRAWN BY: MTT	FIGURE 3
CHECKED BY: OU	REV. D
PROJ. MGMT. APPROVAL:	

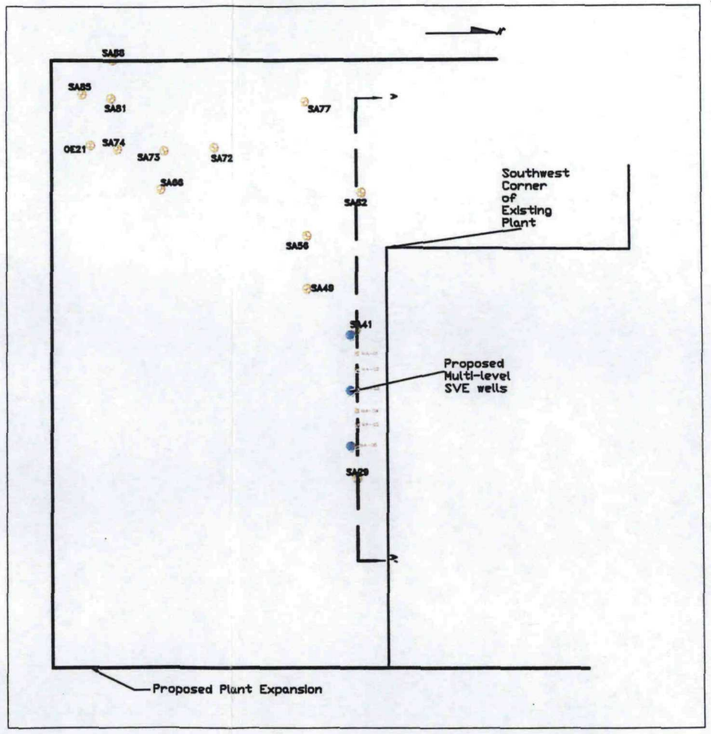
Proposed Multilevel SVE Wells (Typical)
(Main Plant Area)



NOTES

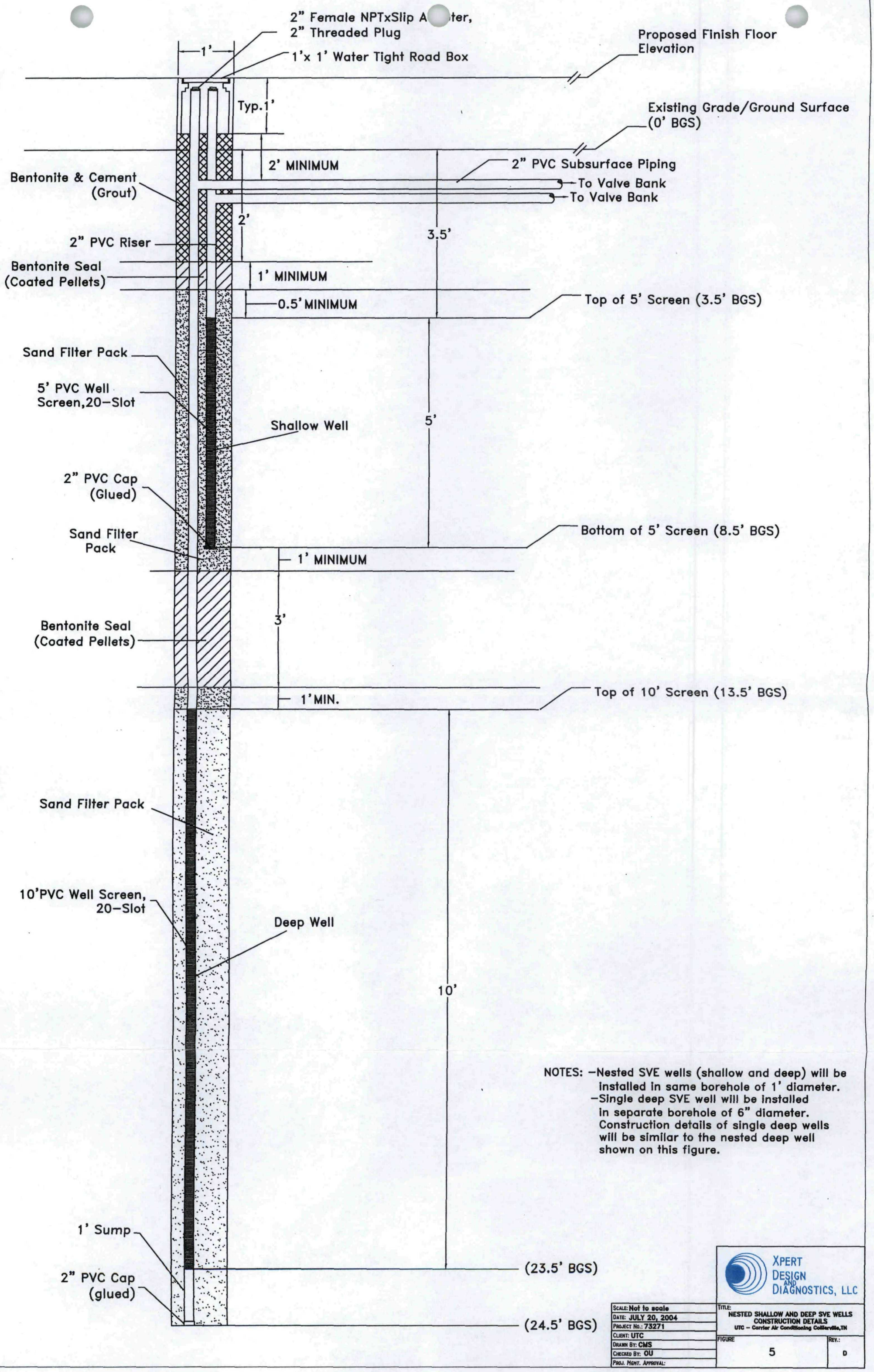
- Boring samples with TCE Exceedance (> 533 ug/Kg) based on 2004 Data
- Boring samples with TCE Exceedance (> 533 ug/Kg) based on 2002 Data
- ND — Boring samples where TCE was non detect (0-20' BGS) - 2004 Data
- <533 — Boring samples where TCE was below 533 ug/Kg - 2004 Data

LOCATION MAP



XPERT DESIGN AND DIAGNOSTICS, LLC

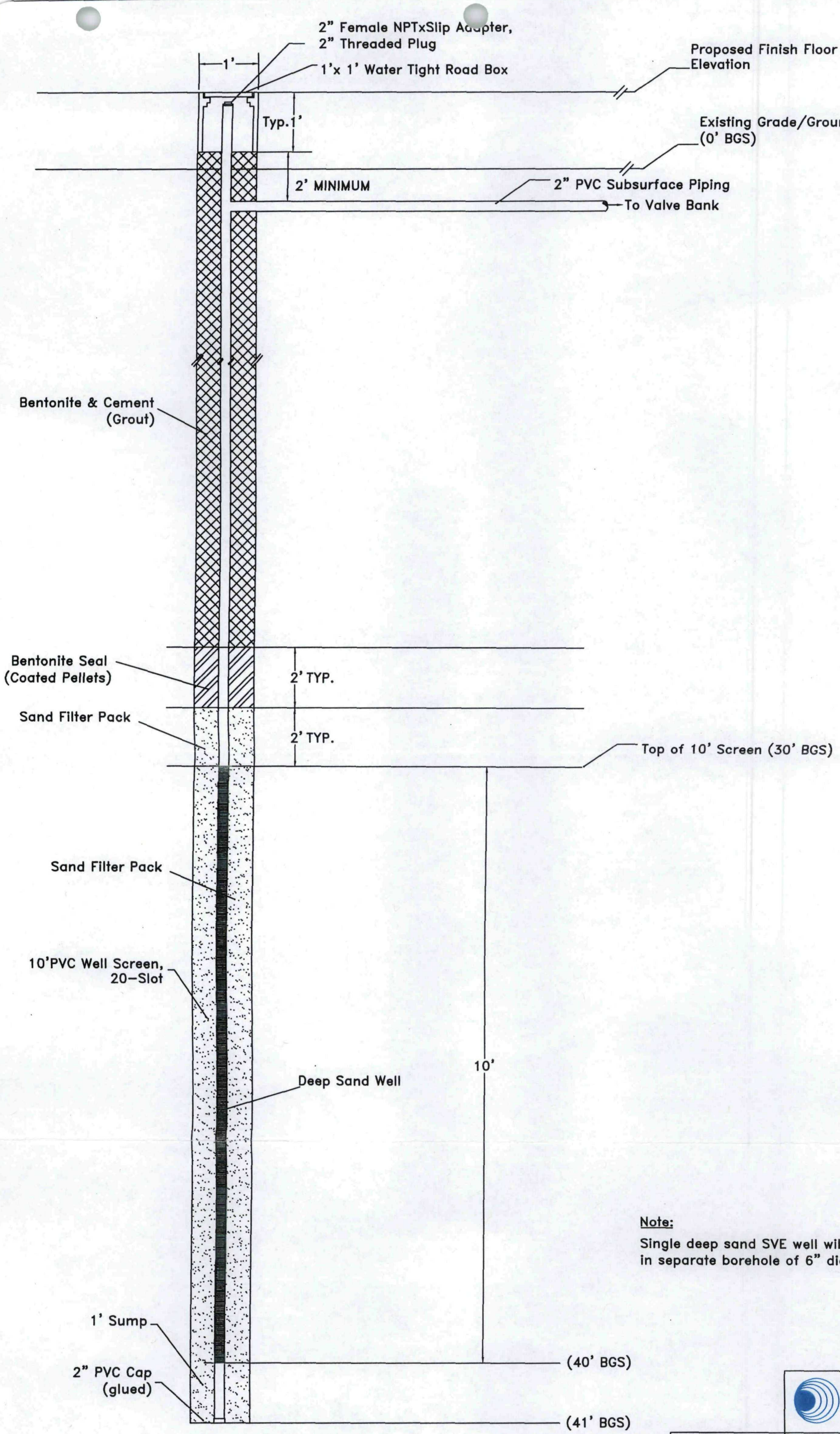
SCALE: As Shown	TITLE: SVE Treatment Areas – MPA Cross–Section View
DATE: JULY 20, 2004	UTC – Carrier Air Conditioning Collierville,TN
PROJECT No.: 73271	
CLIENT: UTC – COLLIERVILLE	
DRAWN BY: PJC	
CHECKED BY: OU	
PROJ. MGMT. APPROVAL:	FIGURE 4 — REV. D



NOTES: -Nested SVE wells (shallow and deep) will be installed in same borehole of 1' diameter.
-Single deep SVE well will be installed in separate borehole of 6" diameter. Construction details of single deep wells will be similar to the nested deep well shown on this figure.

XPERT DESIGN AND DIAGNOSTICS, LLC

SCALE: Not to scale	TITLE: NESTED SHALLOW AND DEEP SVE WELLS CONSTRUCTION DETAILS UTC – Carrier Air Conditioning Collierville,TN
DATE: JULY 20, 2004	
PROJECT No.: 73271	
CLIENT: UTC	
DRAWN BY: CMS	FIGURE: 5
CHECKED BY: OU	REV.: D
PROJ. MGMT. APPROVAL:	

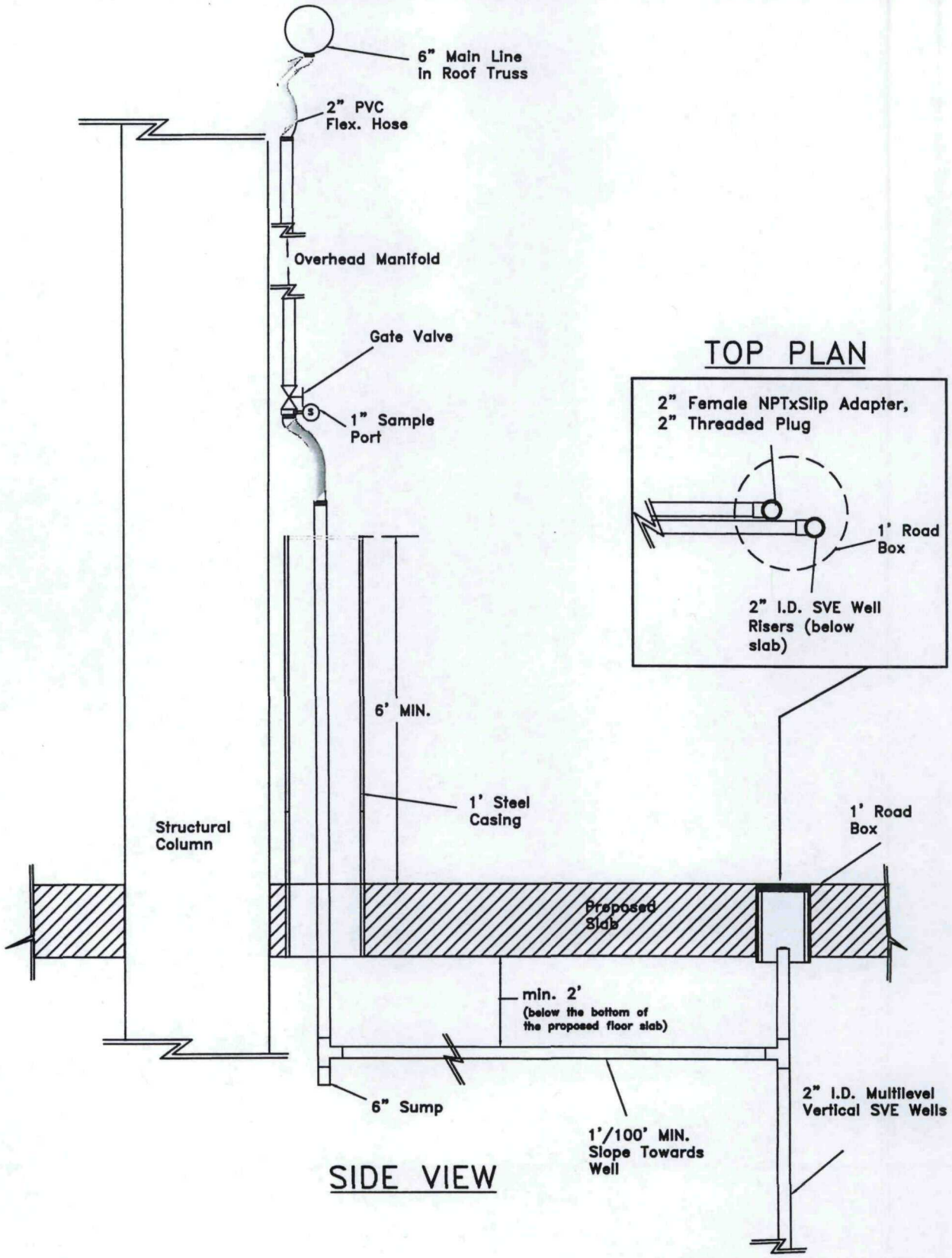


Note:

Single deep sand SVE well will be installed in separate borehole of 6" diameter.

XPERT DESIGN AND DIAGNOSTICS, LLC

SCALE: Not to scale	TITLE: DEEP SAND SVE WELL CONSTRUCTION DETAILS UTC – Carrier Air Conditioning Collierville,TN
DATE: JULY 20, 2004	
PROJECT No.: 73271	
CLIENT: UTC	
DRAWN BY: PJC	FIGURE: 6
CHECKED BY: OU	REV.: D
PROJ. MGMT. APPROVAL:	



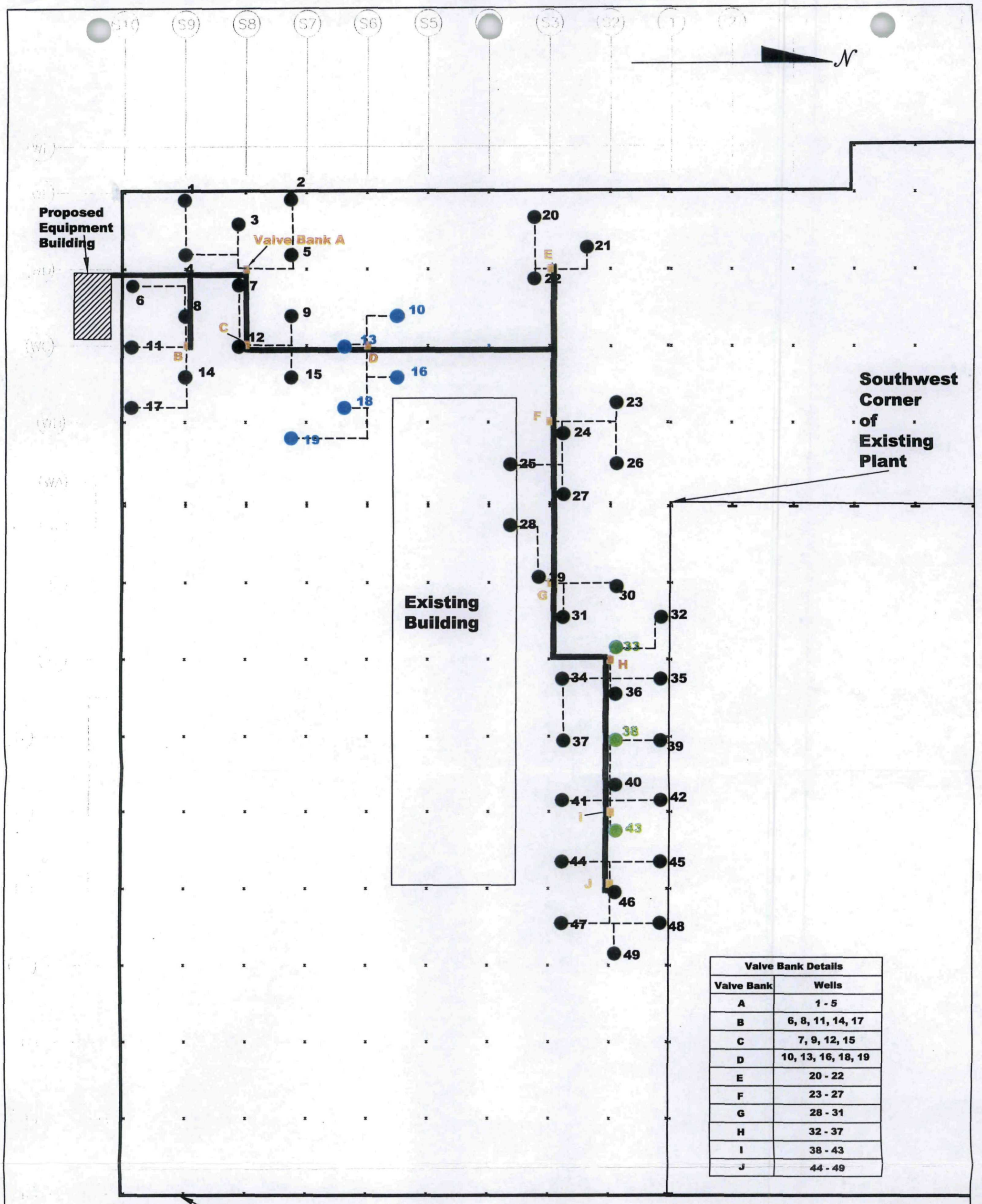
SIDE VIEW

TOP PLAN

Notes:
SVE well below slab manifold is stubbed out near columns.

XPERT DESIGN AND DIAGNOSTICS, LLC.

SCALE: Not to Scale	TITLE: TYPICAL SVE WELL MANIFOLD UTC – Carrier Air Conditioning Collierville,TN
DATE: JULY 20, 2004	
PROJECT No.: 73271	
CLIENT: UTC	
DRAWN BY: MTT	FIGURE 7
CHECKED BY: OU	REV. D
PROJ. MGMT. APPROVAL:	



Valve Bank Details	
Valve Bank	Wells
A	1 - 5
B	6, 8, 11, 14, 17
C	7, 9, 12, 15
D	10, 13, 16, 18, 19
E	20 - 22
F	23 - 27
G	28 - 31
H	32 - 37
I	38 - 43
J	44 - 49

LEGEND

- *Proposed Multilevel Soil Vapor Extraction Wells (Shallow, Deep, and Deep Sand)*
- *Proposed Dual Level Soil Vapor Extraction Wells (Shallow and Deep)*
- *Proposed Single Level Soil Vapor Extraction Well (Deep)*
- *Proposed Main SVE Lines (Overhead Lines)*
- *Proposed Branch Lines (Below Slab Lines)*
- *Valve Bank Location*

Notes: Soil Vapor Extraction Wells are generally spaced (</=) 40 feet on-center
ROI = 20 feet (Clayey silt soils)

Graphic Scale

0 30 60 120

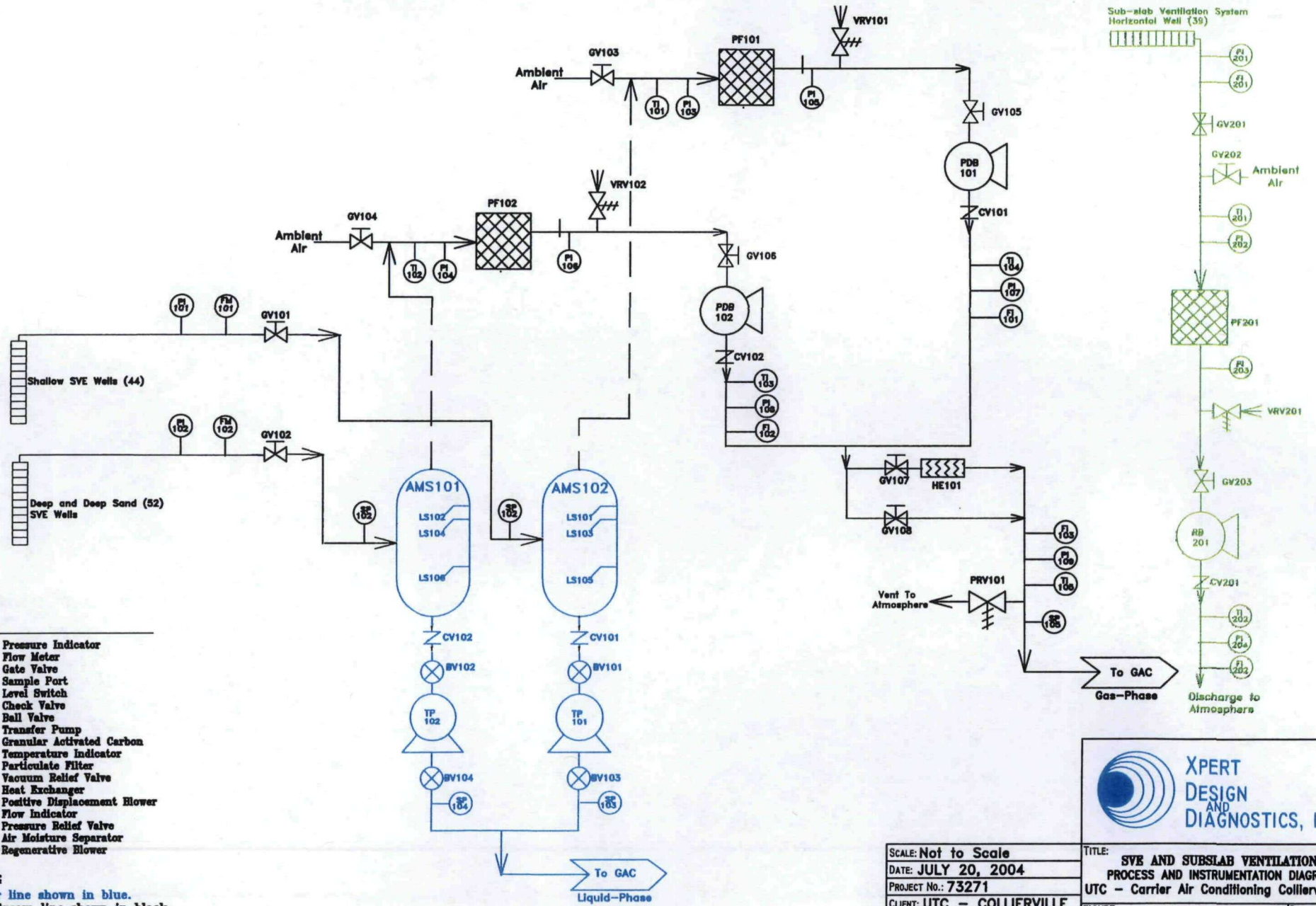
1 inch = 60 ft.

XPERT DESIGN AND DIAGNOSTICS, LLC

Scale: As Shown	Title: SVE WELL LAYOUT & MANIFOLD – MPA
Date: JULY 20, 2004	UTC – Carrier Air Conditioning Collierville,TN
Project No.: 73271	
Client: UTC – COLLIERVILLE	
Drawn By: MTT	Figure: 8
Checked By: OU	Rev.: D
Proj. Mgmt. Approval:	

MAIN PLANT AREA (MPA) SVE SYSTEM

SUBSLAB VENTILATION SYSTEM



KEY:

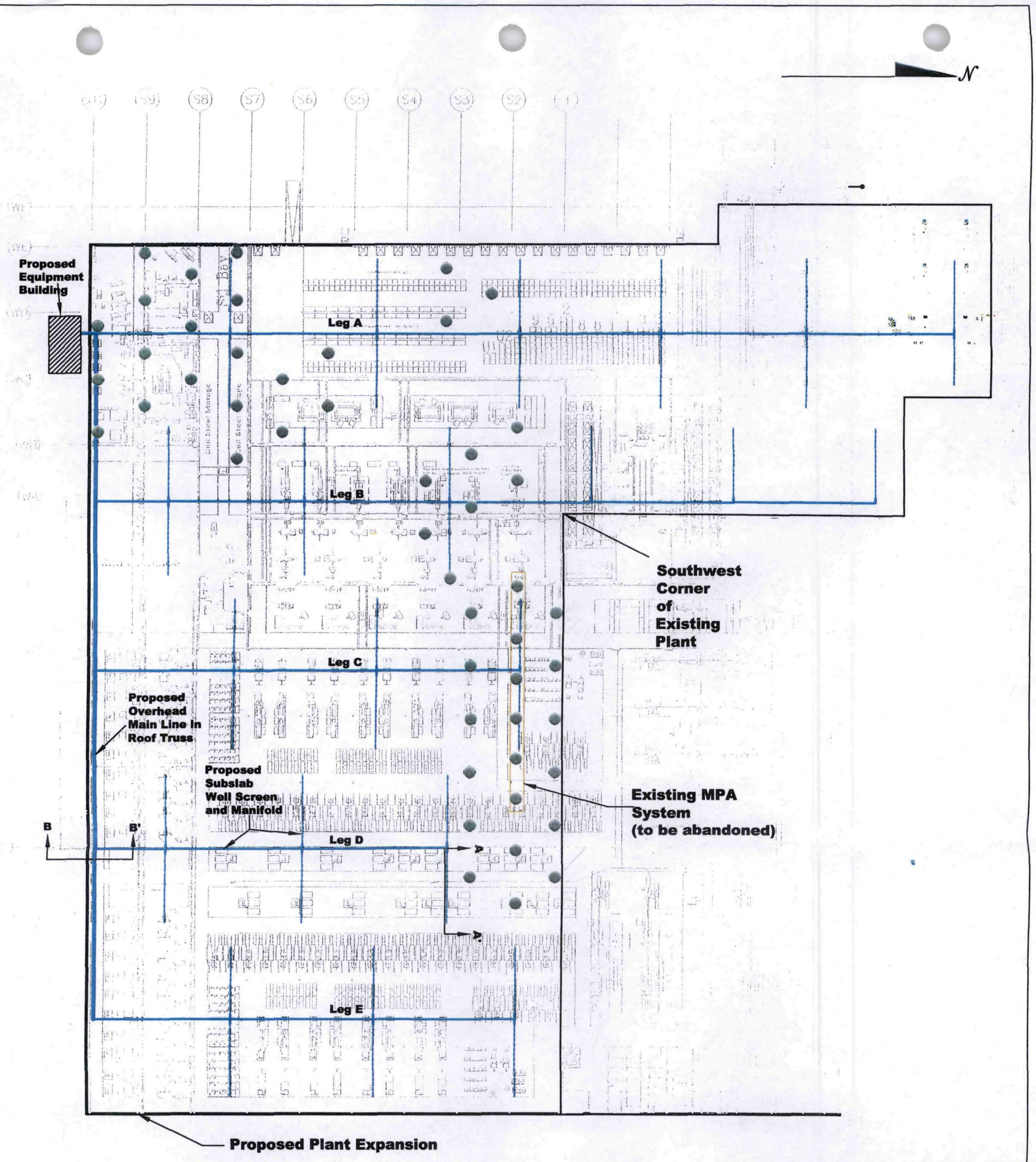
PI	Pressure Indicator
FM	Flow Meter
GV	Gate Valve
SP	Sample Port
LS	Level Switch
CV	Check Valve
BV	Ball Valve
TP	Transfer Pump
GAC	Granular Activated Carbon
TI	Temperature Indicator
PF	Particulate Filter
VRV	Vacuum Relief Valve
HE	Heat Exchanger
PDB	Positive Displacement Blower
FI	Flow Indicator
PRV	Pressure Relief Valve
AMS	Air Moisture Separator
RB	Regenerative Blower

NOTE:

Water line shown in blue.
Air stream line shown in black.
Sub-slab ventilation system shown in green.

XPERT DESIGN AND DIAGNOSTICS, LLC

SCALE: Not to Scale	TITLE: SVE AND SUBSLAB VENTILATION PROCESS AND INSTRUMENTATION DIAGRAM UTC – Carrier Air Conditioning Collierville,TN
DATE: JULY 20, 2004	
PROJECT NO.: 73271	
CLIENT: UTC – COLLIERVILLE	
DRAWN BY: OU	
CHECKED BY:	
PROJ. MGMT. APPROVAL:	FIGURE 9 / REV.: D



LEGEND

- Proposed Soil Vapor Extraction Vertical Wells
- Proposed Main Line: 6" PVC, Typical, Overhead Line
- Proposed Branch Line: 4" PVC, Typical, Below Slab
- Proposed Subslab Ventilation Horizontal Well Screen: 2" PVC, 100' On-Center, 50' L, 10-Slot, Typical

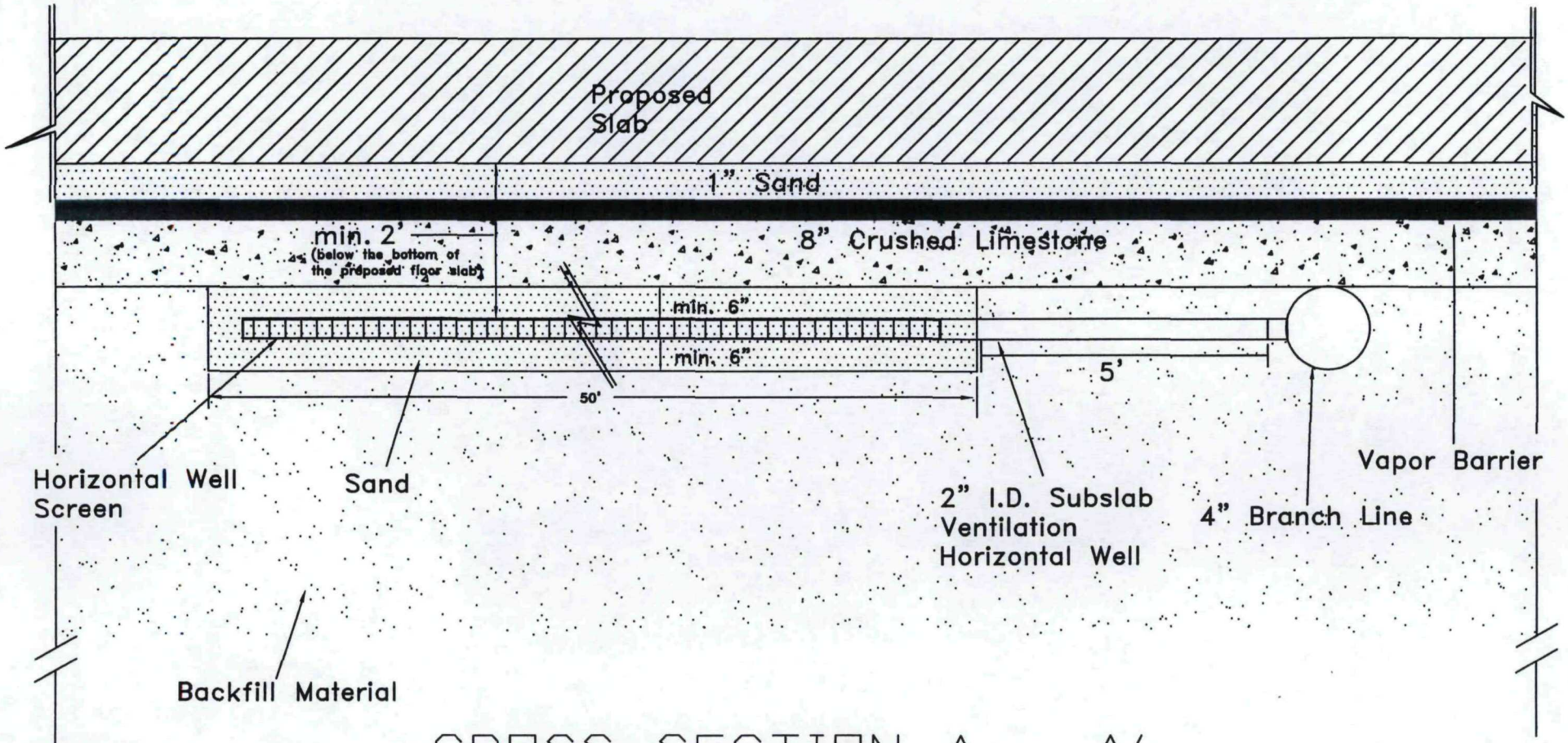
GRAPHIC SCALE

0 75 150

1 inch = 75 ft.

XPERT DESIGN AND DIAGNOSTICS, LLC

SCALE: As shown	TITLE: PROPOSED SUBSLAB VENTILATION HORIZONTAL WELL LAYOUT UTC – Carrier Air Conditioning Collierville,TN
DATE: JULY 20, 2004	
PROJECT No.: 73271	
CLIENT: UTC – COLLIERVILLE	
DRAWN BY: MTT	FIGURE NO. 10
CHECKED BY: OU	REV. D
PROJ. MGMT. APPROVAL:	



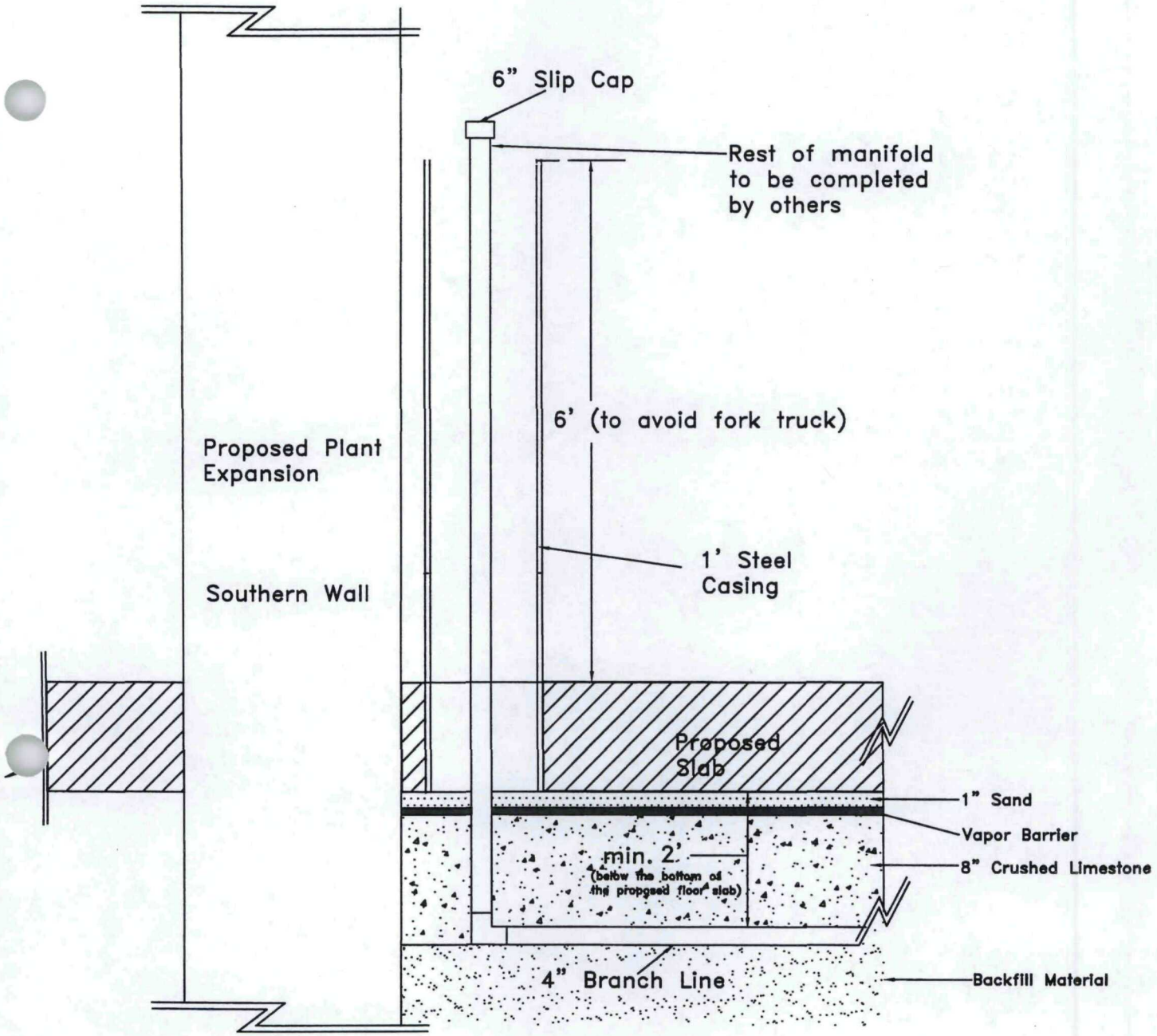
CROSS-SECTION A - A'

Notes:

Suggested subslab ventilation horizontal well *manifold*, alterations to be reviewed by XDD prior to construction

XPERT DESIGN AND DIAGNOSTICS, LLC.

SCALE: Not to Scale	TITLE: SUBSLAB VENTILATION HORIZONTAL WELL MANIFOLD
DATE: JULY 20, 2004	UTC – Carrier Air Conditioning Collierville,TN
PROJECT No.: 73271	
CLIENT: UTC	
DRAWN BY: OU	FIGURE NO. 11
CHECKED BY:	REV. D
PROJ. MGMT. APPROVAL:	



CROSS-SECTION B - B'

Notes:

Suggested subslab ventilation horizontal well manifold, alterations to be reviewed by XDD prior to construction

XPERT DESIGN AND DIAGNOSTICS, LLC.

SCALE: Not to Scale	TITLE: SUBSLAB VENTILATION BRANCH LINE TRANSITION TO MAIN LINE UTC – Carrier Air Conditioning Collierville,TN
DATE: JULY 20, 2004	
PROJECT NO.: 73271	
CLIENT: UTC	
DRAWN BY: PJC	FIGURE NO. 12 / REV. D
CHECKED BY: OU	
PROJ. MGMT. APPROVAL:	

TABLES

TABLE 1
SVE DESIGN SUMMARY TABLE
Main Plant Area - Proposed Soil Vapor Extraction System
Carrier Air Conditioning Site – Collierville, TN
XDD Project No. 73271

SVE WELL LAYOUT

Wells	Screen Interval (feet BGS) [below existing grade]	Target Geology	[1]ROI (feet)	Approximate Well Spacing (feet on-center)	[2]Design Flow Rate [per well] (scfm)	[2]Design Vacuum [at individual wellhead] (inches of H_2O)	Pipe Diameter (inches)	No. of Wells	Materials of Construction
Shallow	3.5 - 8.5	Clayey Silt	20 - 25	≤ 40	8 - 10	50 - 80	2	44	• Riser: Schedule 40 PVC • Screen : Slotted, schedule 40 PVC (20 slot typical)
Deep	13.5 - 23.5	Clayey Silt	20 - 25	≤ 40	10 - 12	50 - 80	2	49	
Deep Sand	30 - 40	Fine to Medium Sand	100 - 120	~ 60	> 15	40 - 60	2	3	

MANIFOLDING
- 2 x 6" I.D. Main SVE Overhead Lines: (Separate Shallow Well Manifold and Deep/Deep Sand Well Manifold)
- 2" I.D. Subslab Branch lines: Branch lines stubbed out at valve bank locations adjacent to structural columns
- Approximately nine (10) valve bank locations

OTHER DESIGN PARAMETERS
- Total No. of SVE Wells = 49 (including 3 multilevel, 41 duel level, 5 single level wells)
- Total No. of SVE Well Screens = 96
- Total Design Flow Rate = 400 - 550 scfm (assuming system will operate in cyclic manner - approximately 1/2 of the total wells operating at a time)
- Total Design Vacuum = 150 - 180 inches of H_2O

NOTES:
The Final Design Report (September 22, 1994) and the ROD (September 3, 1992) are used as the design basis for the proposed SVE system.
ROI = Radius of influence
[1] ROI Source = Final Design Report (September 22, 1994), EPA Five-Year Review Report (August 28, 2000)
[2] Design flow and vacuum at individual wellheads are based on the Final Design Report (September 22, 1994) and the performance data of the existing MPA SVE system.
**** The conceptual operating parameters and configuration (i.e., flow and vacuum at individual wellheads, total flow and vacuum, and SVE operation cycle) may change based on the actual field conditions.***

REFERENCES:
Record of Decision (ROD), Carrier Air Conditioning Site, by USEPA dated September 3, 1992
Final Design Report "Soil Vapor Extraction - Carrier Air Conditioning Site - Main Plant Area" by Environmental and Safety Designs, Inc. dated September 22, 1994
EPA Five-Year Review Report, Carrier Air Conditioning Site, USEPA Region Four, dated August 28, 2000

TABLE 2
SUBSLAB VENTILATION DESIGN SUMMARY TABLE
Proposed Plant Expansion Building - Subslab Ventilation System
Carrier Air Conditioning Site – Collierville, TN
XDD Project No. 73271

SUBSLAB VENTILATION HORIZONTAL WELL LAYOUT

System Legs	No. of Horizontal Screens	Screen Length (feet)	Subslab Media	ROI (feet)	Screen Spacing (feet on-center)	Branch Line Spacing (feet on-center)	Design Flow Rate per Screen (scfm)	Design Vacuum at Screen (inches of H_2O)	Screen Diameter (inches)	Material of Construction
A through E	12 (Leg A) 9 (Leg B) 6 (Leg C) 6 (Leg D) 6 (Leg E)	50	Fill/Crushed Limestone	> 50	100	~ 120	~ 2.5 - 4	~ 3 - 7	2	Slotted, schedule 40 PVC (10-slot typical)

MANIFOLDING
- Proposed Branch Line: 4" PVC Typical, Below Slab
- Proposed Main Line: 6" PVC Typical, Overhead Line

OTHER DESIGN PARAMETERS
- Total No. of Horizontal Well Screens = 39
- Total Design Flow Rate = 100 - 150 scfm
- Total Design Vacuum = 30 - 50 inches of H2O
- Required Vacuum[1] underneath the slab at any point > 0.10 inches of H_2O

NOTES:
Subslab ventilation system design parameters such as ROI, design flow, and design vacuum are based on the vapor transport numerical modeling results using AIR-3D. The results of the AIR-3D modeling can be obtained upon request.
ROI = Radius of influence
[1] The "Required Vacuum" underneath the slab is based on the design HVAC vacuum (1/10 inches of H_2O) in the proposed expansion building.
** The conceptual operating parameters and configuration (i.e., flow and vacuum at individual well screens, total flow, and total vacuum) may change based on the actual field conditions.*

REFERENCES:
Baehr, A.L., Welty, C., and Joss, C.J. 1994. AIR3D: A Three Dimensional Model of Air Flow in the Unsaturated Zone – Version 1.0. American Petroleum Institute (API) Publication #4594.

Appendix C
1996 Carrier-Town of Collierville Agreement for Operations at WP#2

AGREEMENT

This Agreement is made as of the 12th day of April, 1996 by and between Carrier Corporation, a Delaware Corporation with its principal office at One Carrier Place, Farmington, Connecticut 06101 (Carrier), and the City of Collierville, a municipal corporation existing under the laws of the State of Tennessee, with its principal offices at 101 Walnut Street, Collierville, Tennesee (the City).

Whereas, Carrier owns a parcel of land in Collierville, Tennessee of about 135 acres on which it operates an air conditioner manufacturing plant (the plant); and

Whereas, the City formerly owned this plant site, and leased it to Carrier until about 1987 during which time the plant was constructed by the City and operated by Carrier; and

Whereas, the City owns and operates two municipal water supply wells located nearby the plant, known as Water Plant No. 2; and

Whereas, the United States Environmental Protection Agency (EPA) has listed the plant as a site requiring remedial action under the National Priorities List (NPL) under section 105 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 U.S.C. § 9605; and

Whereas, pursuant to an Administrative Consent Order (ACO) agreed to in 1989, Carrier agreed to undertake and has carried out at its expense a Remedial Investigation and Feasibility Study (RI/FS) satisfactory to EPA, addressing the scope and appropriate remedy for alleged contamination at the plant; and

Whereas, in September 1992, the Regional Administrator of EPA Region IV signed a Record of Decision (ROD) specifying the appropriate remediation for the plant; and

Whereas, in February 1993, EPA Region IV issued a Unilateral Administrative Order (UAO) to Carrier to conduct the work specified in the ROD pursuant to the Statement of Work (SOW) issued with the UAO; and

Whereas, Carrier has been carrying out the work specified in the ROD, in cooperation with the City, and in a manner satisfactory to EPA, at a cost to date of several million dollars to Carrier; and

Whereas, the City has cooperated with Carrier as Carrier has been carrying out the work specified in the ROD by providing services which have helped facilitate compliance with the UAO; and

Whereas, the City has requested Carrier to pay certain attorney's fees incurred by the City in connection with the issuance of the UAO, and Carrier has denied liability for such fees; and

Whereas, Carrier and the City desire to continue the cooperative relationship which has so far characterized this work.

In consideration of the mutual covenants and undertakings expressed herein, the parties having had ample opportunity to consult with counsel of their choice, the parties agree as follows:

1. Carrier shall pay the City, within 45 days of the approval of this agreement by both parties, the sum of $8,456.98, to defray attorney's fees and disbursements of the City incurred in connection with the negotiations leading up to the issuance of the UAO and its initial stages of implementation.

2. The City acknowledges that it has no other expenses for which it will seek reimbursement from Carrier which have been incurred to date relating to the issuance of the UAO and its initial stages of implementation. Except as to the provisions of ¶ 1, each party shall bear its own costs in connection with the obligations set forth in this Agreement. Each party covenants that it will not sue the other for any expenses incurred to date as a result of the issuance of the UAO and its implementation, or in connection with remediation at the plant pursuant to the ROD or the SOW. Through the date of this Agreement, this Agreement defines all obligations that exist between the City and Carrier with respect to the UAO and its implementation, remediation at the plant pursuant to the ROD and the SOW, and any other activities undertaken by Carrier or the City relating to remediation at the plant that have occurred. This Agreement does not address future cooperation in implementing the ROD (as it may be amended from time to time) at the plant, and the allocation of responsibility for such future work. This Agreement also does not address any alleged contamination at the plant which is not identified or address in the RI/FS, the ROD, and the results of sampling at the site submitted to EPA through the date of the Agreement.

3. This agreement is entered into to compromise disputed claims and shall not be construed as an admission of any allegation of law or fact.

4. This agreement represents the entire agreement between the parties concerning the subject matter discussed herein, and supersedes any prior agreements whether written or verbal. This agreement may only be modified in writing signed by an authorized official of each party.

In witness whereof, this Agreement has been made by the parties hereto, and executed by their duly authorized representatives, as of the date first above written.

City of Collierville

By _____
Herman W. Cox, Mayor
by authority of
the board of Alderman
resolution dated
3-25-96

Carrier Corporation

By Robert F. Gelli

Title: Vice President + General Counsel

AGREEMENT

This Agreement is made as of the 12th day of April, 1996 by and between Carrier Corporation, a Delaware Corporation with its principal office at One Carrier Place, Farmington, Connecticut 06101 (Carrier), and the City of Collierville, a municipal corporation existing under the laws of the State of Tennessee, with its principal offices at 101 Walnut Street, Collierville, Tennessee (the City).

Whereas, Carrier owns a parcel of land in Collierville, Tennessee of about 135 acres on which it operates an air conditioner manufacturing plant (the plant); and

Whereas, the City formerly owned this plant site, and leased it to Carrier until about 1987 during which time the plant was constructed by the City and operated by Carrier; and

Whereas, the City owns and operates two municipal water supply wells located nearby the plant, known as Water Plant No. 2; and

Whereas, the United States Environmental Protection Agency (EPA) has listed the plant as a site requiring remedial action under the National Priorities List (NPL) under section 105 of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), 42 U.S.C. § 9605; and

Whereas, EPA gave Carrier and the City notice in 1988 that EPA considered Carrier and the City to be potentially responsible parties for the remediation of the alleged contamination at the plant; and

Whereas, pursuant to an Administrative Consent Order (ACO) agreed to in 1989, Carrier agreed to undertake and has carried out at its expense a Remedial Investigation and Feasibility Study (RI/FS) satisfactory to EPA, addressing the scope and appropriate remedy for alleged contamination at the plant; and

Whereas, in September 1992, the Regional Administrator of EPA Region IV signed a Record of Decision (ROD) specifying the appropriate remediation for the plant; and

Whereas, in February 1993, EPA Region IV issued a Unilateral Administrative Order (UAO) to Carrier to conduct the work specified in the ROD pursuant to the Statement of Work (SOW) issued with the UAO; and

Whereas, Carrier has been carrying out the work specified in the ROD and SOW, in cooperation with the City, and in a manner satisfactory to EPA, at a cost to date of several million dollars to Carrier; and

Whereas, the City has cooperated with Carrier as Carrier has been carrying out the work specified in the ROD by providing services which have helped facilitate compliance with the UAO; and

Whereas, Carrier and the City desire to continue the cooperative relationship which has so far characterized this work.

In consideration of the mutual covenants and undertakings expressed herein, the parties having had ample opportunity to consult with counsel of their choice, the parties agree as follows:

1. Each party covenants that it will not sue the other for costs incurred after the date of this Agreement as a result of the issuance of the UAO and its implementation, or in connection with remediation at the plant pursuant to the ROD or SOW. Each party shall bear its own costs in connection with the obligations set forth in this Agreement. Beginning one day after the date of this Agreement, this Agreement shall define all obligations that exist between the City and Carrier with respect to the UAO and its implementation, remediation at the plant pursuant to the ROD and the SOW, and any other activities undertaken by Carrier or the City relating to remediation at the plant. The parties do not address responsibility for additional work required by any amendment by EPA to the ROD. In the event of such ROD amendment, each party shall continue to carry out its obligations under this Agreement, except for a specific item of work or performance which EPA has specifically eliminated or so substantially modified as to make performance of that specific obligation unnecessary to carry out the work in the ROD, as amended, or SOW as amended.

2. The City's responsibilities to carry out the work in the ROD or SOW shall be limited to those obligations it undertakes in this agreement. Carrier shall, to EPA's satisfaction, carry out the other work provided for in the ROD or SOW, including, but not limited to, (1) soil vapor extraction of alleged contamination in areas where Carrier and EPA have agreed such work is appropriate pursuant to the ROD and SOW, and (2) continued sampling and chemical analysis of soil, ground water, and finished water from Water Plant No. 2, as required by EPA pursuant to the ROD and SOW. The parties acknowledge that any imposition of institutional controls on well drilling and construction is an issue for the City and not Carrier to address.

3. The City shall continue to operate Water Plant No. 2 at least until remedial activities provided under this Agreement produce raw water at both wells which has met National Primary Drinking Water Standards for five years or until such later time as may be required by EPA or by any other governmental authority.

4. The City shall continue to assure compliance with National Primary Drinking Water Standards in finished water produced at Plant No. 2, and shall continue to comply with all other applicable standards, including those for chlorination and monitoring, as required by law. If required to assure continued compliance with standards for volatile organic compounds (VOCs) in finished water at Water Plant No. 2, upon the City's request, Carrier, at its own expense, shall repair, refurbish, rebuild, or replace, as needed, the packed stripper towers heretofore provided by

Carrier to the City at Carrier's expense. Carrier shall inspect the packed stripper towers as needed to determine what, if any, repair, refurbishment, rebuilding, or replacement of the packed stripper towers may be necessary to assure continued compliance with VOC standards and shall report the results of such inspection to the City. If, despite such inspection, repair, refurbishment, rebuilding, or replacement, the packed stripper towers become inadequate to maintain compliance with VOC standards by the finished water produced by Water Plant No. 2 when the wells are operated at the maximum rated capacity as of the date of this agreement, then upon the City's request, Carrier, at its own expense, shall upgrade the treatment equipment in order to assure continued compliance with VOC standards in finished water produced at Water Plant No. 2.

5. The City shall operate Water Plant No. 2 at a weekly production rate of not less than 7.5 million gallons, until the condition provided for in ¶ 3 is satisfied.

6. The City shall not take the west well at Water Plant No. 2 out of production for more than two consecutive weeks at any one time, or the east well at Water Plant No. 2 out of production for more than four consecutive weeks at any one time, or both wells together at Water Plant No. 2 out of production for more than two consecutive weeks at any one time, until the condition provided for in ¶ 3 is satisfied.

7. The City shall provide Carrier notice within 24 hours of any unscheduled cessation of pumping operations at Water Plant No. 2, and shall provide 30 days notice of scheduled maintenance removing Water Plant No. 2 from service for more than 24 hours.

8. The City shall provide Carrier, EPA, and their respective contractors access to Water Plant No. 2 for workers, machines and materials, upon one day's notice and without any fee or other charge, to conduct such tests, studies, samples, and other work as may be required or deemed by Carrier or EPA to be necessary in order to carry out the work specified in the ROD.

9. This agreement is entered into to resolve potential claims and shall not be construed as an admission of any allegation of law or fact.

10. This agreement represents the entire agreement between the parties concerning the subject matter discussed herein, and supersedes any prior agreements whether written or verbal. Expenses occurring to date are addressed in a separate agreement of even date. This agreement may only be modified in writing signed by an authorized official of each party.

11. a. The parties recognize that certain events completely outside the control of the City or Carrier, may make performance of the City's obligations under this agreement temporarily impossible, or may delay performance of Carrier's obligations under this agreement.

b. The City's designated contact person shall notify Carrier's designated contact person within 48 hours after the City first knows or has notice that an event might cause, or has caused a temporary failure by the City to perform or comply with its obligations under this agreement. Carrier and the City shall promptly confer in an effort to prevent, cure, or minimize the City's

temporary failure to perform or comply. The City shall adopt all reasonable measures to avoid, cure, or minimize its temporary failure to perform or comply. In the event of that temporary equipment failure at Water Plant No. 2 makes full compliance with the City's obligations under ¶¶ 5 or 6 of this agreement infeasible, the City shall continue to operate the remaining equipment at the maximum capacity feasible, consistent with the production of finished water in compliance with applicable standards. Increased costs or expenses associated with performance of the City's obligations under this agreement shall not be considered circumstances beyond the reasonable control of the City.

c. In the event, Carrier invokes the delay in performance clause in the UAO (§ XXII, ¶ B), Carrier's designated contact person shall promptly notify the City's designated contact person and provide copies of the information and materials submitted by Carrier to EPA pursuant to that clause of the UAO. Carrier shall adopt all reasonable measures to prevent, cure, or minimize such delay, and increased costs of performance shall not be considered circumstances beyond the control of Carrier, provided however, that Carrier is not required pursuant to this clause to assume performance of the City's obligations under this agreement.

12. a. The parties shall, within 20 days of the date of this agreement, designate a contact person for the receipt of any written or telephone notice pursuant to this agreement, together with the address and telephone number where the contact person can be promptly reached in the event notice is required in 48 hours or less under this agreement. The parties shall make this designation in writing, and shall keep this information current. The contact person may be changed on five days written notice to the other party.

b. In the event oral or telephone notice of a problem is provided by one party to the other under this agreement, a follow-up written notice shall be provided to the other party within five working days, stating that the identified problem has been corrected, and summarizing the steps taken to do so, or if not fully corrected, summarizing the steps taken to date in order to correct the problem, together with the schedule of remaining steps to correct the problem.

13. Carrier shall provide the City copies of the written monthly and annual progress reports it makes to EPA pursuant to § XIV, A and D of the UAO, and shall provide the City such materials within two weeks of the time they are provided to EPA.

In witness whereof, this Agreement has been made by the parties hereto, and executed by their duly authorized representatives, as of the date first above written.

City of Collierville

By _____
Herman W. Cox, Mayor
by authority of
the board of Alderman
resolution dated
3-25-96

Carrier Corporation

By _____

Title: Vice President and General Counsel

Appendix D
Backup Data for Mass Removal Calculations

NRS MASS REMOVAL DATA
NO AIR TREATMENT
5/1/04 THROUGH 10/31/04 REPORTING PERIOD

Date	Air Velocity (LFM)	Flow Rate (m3/min)	Concentration ($\mu g/m^3$)	Mass Removal (Lbs./Day)	Elapsed Days of Operation	Total Mass Removed (lbs)	
5/1/2003	0	0	0	0	0	0	System not operational.
6/1/2003	0	0	0	0	0	0	System not operational.
7/1/2003	0	0	0	0	0	0	System not operational.
8/1/2003	0	0	0	0	0	0	System not operational.
9/1/2003	0	0	0	0	0	0	System not operational.
10/1/2003	0	0	0	0	0	0	System not operational.
11/1/2003	0	0	0	0	0	0	System not operational.
12/8/2003	0	0	0	0	0	0	System not operational.
12/9/2003	4761	2.94	350,000	3.26	1	3.26	velocity assumed from March 2004 data; concentration assumed to be 1/2 March 2004 data
1/1/2004	4761	2.94	350,000	3.26	23	75.05	velocity assumed from March 2004 data; concentration assumed to be 1/2 March 2004 data
2/2/2004	4761	2.94	350,000	3.26	32	104.41	velocity assumed from March 2004 data; concentration assumed to be 1/2 March 2004 data
3/1/2004	4761	2.94	350,000	3.26	28	91.36	velocity assumed from March 2004 data; concentration assumed to be 1/2 March 2004 data
3/11/2004	2139	1.32	700,000	2.93	10	29.32	
4/22/2004	2720	1.68	460,000	2.45	42	102.90	
5/5/2004	2825	1.75	320,000	1.77	13	23.01	
6/1/2004	2288	1.41	310,000	1.39	27	37.50	
7/1/2004	2587	1.60	74,000	0.37	30	11.25	
8/4/2004	5342	3.30	370,000	3.87	34	131.59	
9/13/2004	5370	3.32	370,000	3.89	40	155.62	Laboratory changes in September 2004 resulted in incomplete analysis of NRS effluent. Correct analytical methods have been identified. Concentrations assumed from 8/4/04 data.
10/28/2004	5388	3.33	22,200	0.23	45	10.54	

FLOW RATE =
(VELOC.)x(AREA)x0.02832
(lfm)x(SF)x(conv. to meters)

MASS REMOVAL =
(FLOW)x(CONC.)x1440x2.2x1E-09
(m3/min)x(ug/m3)x(min/day)x(lbs/kg)x(kg/ug

TOTAL MASS =
(MASS REMOVAL)x(DAYS)

Title V Reporting	rolling - daily average (lbs/day)	rolling - cumulative lbs/year
May-04	0.07	429.32
Jun-04	0.07	466.82
Jul-04	0.03	478.06
Aug-04	0.08	609.65
Sep-04	0.14	765.28
Oct-04	0.13	775.82

NOTES:

diameter	2
area	0.021825397

NOTE: BECAUSE THERE ARE NO AIR EMISSIONS CONTROLS AT NRS, THE TOTAL MASS REMOVED IS THE TOTAL MASS EMITTED
ROLLING DAILY AVERAGE BASED ON PREVIOUS 3 MONTHS (QUARTER)
ROLLING CUMULATIVE BASED ON PREVIOUS 12 MONTHS

MPA MASS REMOVAL DATA (INFLUENT)
PRE-CARBON
5/1/04 THROUGH 10/31/04 REPORTING PERIOD

TCE

Date	Air Flow	Flow Rate (m^3/min)	Concentration ($\mu g/m^3$)	Mass Removal (Lbs./Day)	Elapsed Days of Operation	Total Mass Removed	
5/1/2003	0	0.00	0	0	0	0	System not operational.
6/1/2003	0	0.00	0	0	0	0	System not operational.
7/1/2003	0	0.00	0	0	0	0	System not operational.
8/1/2003	0	0.00	0	0	0	0	System not operational.
9/1/2003	0	0.00	0	0	0	0	System not operational.
10/1/2003	0	0.00	0	0	0	0	System not operational.
11/1/2003	0	0.00	0	0	0	0	System not operational.
12/1/2003	0	0.00	0	0	0	0	System not operational.
1/1/2004	0	0.00	0	0	0	0	System not operational.
2/1/2004	0	0.00	0	0	0	0	System not operational.
3/1/2004	0	0.00	0	0	0	0	System not operational.
4/1/2004	0	0.00	0	0	0	0	System not operational.
4/28/2004	0	0.00	0	0	0	0	System startup.
5/5/2004	80	2.27	7300	0.05	7	0.37	Sample IDs switched - use sample from 13:40 pm, per M. Allen, SAS.
6/1/2004	75	2.12	43000	0.29	27	7.81	
7/1/2004	78	2.21	77000	0.54	30	16.17	
8/4/2004	72	2.04	28000	0.18	34	6.15	
8/19/2004	68	1.93	28000	0.17	15	2.56	Data assumed from 8/4/04. System Operations terminated on 8/19/04.
9/1/2004	0	0.00	0	0.00	0	0.00	System not operational.
10/1/2004	0	0.00	0	0.00	0	0.00	System not operational.

FLOW RATE =
(FLOW)x0.02832
(cfm)x(conv. to meters)

MASS REMOVAL =
(FLOW)x(CONC.)x1440x2.2x1E-09
(m3/min)x(ug/m3)x(min/day)x(lbs/kg)x(kg/ug)

TOTAL MASS =
(MASS REMOVAL)x(DAYS)

MPA MASS REMOVAL DATA (INFLUENT)
PRE-CARBON
5/1/04 THROUGH 10/31/04 REPORTING PERIOD

DCE

Date	Air Flow	Flow Rate (m^3/min)	Concentration (µg/m^3)	Mass Removal (Lbs./Day)	Elapsed Days of Operation	Total Mass Removed	
5/1/2003	0	0.00	0	0	0	0	System not operational.
6/1/2003	0	0.00	0	0	0	0	System not operational.
7/1/2003	0	0.00	0	0	0	0	System not operational.
8/1/2003	0	0.00	0	0	0	0	System not operational.
9/1/2003	0	0.00	0	0	0	0	System not operational.
10/1/2003	0	0.00	0	0	0	0	System not operational.
11/1/2003	0	0.00	0	0	0	0	System not operational.
12/1/2003	0	0.00	0	0	0	0	System not operational.
1/1/2004	0	0.00	0	0	0	0	System not operational.
2/1/2004	0	0.00	0	0	0	0	System not operational.
3/1/2004	0	0.00	0	0	0	0	System not operational.
4/1/2004	0	0.00	0	0	0	0	System not operational.
4/28/2004	0	0.00	0	0	0	0	System startup.
5/5/2004	80	2.27	93000	0.67	7	4.67	Sample IDs switched - use sample from 13:40 pm, per M. Allen, SAS.
6/1/2004	75	2.12	3600	0.02	27	0.65	
7/1/2004	78	2.21	11000	0.08	30	2.31	
8/4/2004	72	2.04	4900	0.03	34	1.08	
8/19/2004	68	1.93	4900	0.03	15	0.45	Data assumed from 8/4/04. System Operations terminated on 8/19/04.
9/1/2004	0	0.00	0	0.00	0	0.00	System not operational.
10/1/2004	0	0.00	0	0.00	0	0.00	System not operational.

FLOW RATE =
(FLOW)x0.02832
(cfm)x(conv. to meters)

MASS REMOVAL =
(FLOW)x(CONC.)x1440x2.2x1E-09
(m3/min)x(ug/m3)x(min/day)x(lbs/kg)x(kg/ug)

TOTAL MASS =
(MASS REMOVAL)x(DAYS)

MPA MASS REMOVAL DATA (INFLUENT)
PRE-CARBON
5/1/04 THROUGH 10/31/04 REPORTING PERIOD

Vinyl Chloride

Date	Air Flow	Flow Rate (m^3/min)	Concentration ($\mu g/m^3$)	Mass Removal (Lbs./Day)	Elapsed Days of Operation	Total Mass Removed	
5/1/2003	0	0.00	0	0	0	0	System not operational.
6/1/2003	0	0.00	0	0	0	0	System not operational.
7/1/2003	0	0.00	0	0	0	0	System not operational.
8/1/2003	0	0.00	0	0	0	0	System not operational.
9/1/2003	0	0.00	0	0	0	0	System not operational.
10/1/2003	0	0.00	0	0	0	0	System not operational.
11/1/2003	0	0.00	0	0	0	0	System not operational.
12/1/2003	0	0.00	0	0	0	0	System not operational.
1/1/2004	0	0.00	0	0	0	0	System not operational.
2/1/2004	0	0.00	0	0	0	0	System not operational.
3/1/2004	0	0.00	0	0	0	0	System not operational.
4/1/2004	0	0.00	0	0	0	0	System not operational.
4/28/2004	0	0.00	0	0	0	0	System startup.
5/5/2004	80	2.27	BDL	0.00	7	0.00	Sample IDs switched - use sample from 13:40 pm, per M. Allen, SAS.
6/1/2004	75	2.12	BDL	0.00	27	0.00	
6/9/2004	78	2.21	BDL	0.00	8	0.00	Assumed from 6/1/04.
7/1/2004	78	2.21	BDL	0.00	22	0.00	
8/4/2004	72	2.04	BDL	0.00	34	0.00	
8/19/2004	68	1.93	BDL	0.00	15	0.00	Data assumed from 8/4/04. System Operations terminated on 8/19/04.
9/1/2004	0	0.00	0	0.00	0	0.00	System not operational.
10/1/2004	0	0.00	0	0.00	0	0.00	System not operational.

FLOW RATE =
(FLOW)x0.02832
(cfm)x(conv. to meters)

MASS REMOVAL =
(FLOW)x(CONC.)x1440x2.2x1E-09
(m3/min)x(ug/m3)x(min/day)x(lbs/kg)x(kg/ug)

TOTAL MASS =
(MASS REMOVAL)x(DAYS)

MPA AIR EMISSIONS DATA
POST-CARBON
5/1/04 THROUGH 10/31/04 REPORTING PERIOD

TCE

Date	Air Flow	Flow Rate (m^3/min)	Concentration (µg/m^3)	Mass Removal (Lbs./Day)	Elapsed Days of Operation	Total Mass Removed	
5/1/2003	0	0.00	0	0	0	0	System not operational.
6/1/2003	0	0.00	0	0	0	0	System not operational.
7/1/2003	0	0.00	0	0	0	0	System not operational.
8/1/2003	0	0.00	0	0	0	0	System not operational.
9/1/2003	0	0.00	0	0	0	0	System not operational.
10/1/2003	0	0.00	0	0	0	0	System not operational.
11/1/2003	0	0.00	0	0	0	0	System not operational.
12/1/2003	0	0.00	0	0	0	0	System not operational.
1/1/2004	0	0.00	0	0	0	0	System not operational.
2/1/2004	0	0.00	0	0	0	0	System not operational.
3/1/2004	0	0.00	0	0	0	0	System not operational.
4/1/2004	0	0.00	0	0	0	0	System not operational.
4/28/2004	0	0.00	0	0	0	0	System startup.
5/5/2004	80	2.27	41000	0.29	7	2.06	Sample IDs switched - use sample from 13:30 pm, per M. Allen, SAS.
5/13/2004	74	2.10	41000	0.27	8	2.18	Data ssumed from 5/5/04.
5/19/2004	77	2.18	41000	0.28	6	1.70	Data ssumed from 5/5/04.
5/27/2004	77	2.18	41000	0.28	8	2.27	Data ssumed from 5/5/04.
6/1/2004	75	2.12	190000	1.28	5	6.39	
6/9/2004	78	2.21	190000	1.33	8	10.64	Data ssumed from 6/1/04.
6/17/2004	78	2.21	190000	1.33	8	10.64	Data ssumed from 6/1/04.
6/24/2004	82	2.32	190000	1.40	7	9.78	Data ssumed from 6/1/04.
7/1/2004	78	2.21	73000	0.51	7	3.58	
7/8/2004	79	2.24	73000	0.52	7	3.62	Data ssumed from 7/1/04.
7/15/2004	77	2.18	73000	0.50	7	3.53	Data ssumed from 7/1/04.
7/22/2004	73	2.07	73000	0.48	7	3.35	Data ssumed from 7/1/04.
7/29/2004	74	2.10	73000	0.48	7	3.39	Data ssumed from 7/1/04.
8/4/2004	72	2.04	440	0.00	6	0.02	
8/12/2004	68	1.93	440	0.00	8	0.02	Data ssumed from 8/4/04.
8/19/2004	68	1.93	440	0.00	7	0.02	Data assumed from 8/4/04. System Operations terminated on 8/19/04.
9/1/2004	0	0.00	0	0.00	0	0.00	System not operational.
10/1/2004	0	0.00	0	0.00	0	0.00	System not operational.

FLOW RATE =
(FLOW)x0.02832
(cfm)x(conv. to meters)

MASS REMOVAL =
(FLOW)x(CONC.)x1440x2.2x1E-09
(m3/min)x(ug/m3)x(min/day)x(lbs/kg)x(kg/ug)

TOTAL MASS =
(MASS REMOVAL)x(DAYS)

MPA AIR EMISSIONS DATA
POST-CARBON
5/1/04 THROUGH 10/31/04 REPORTING PERIOD

DCE

Date	Air Flow	Flow Rate (m^3/min)	Concentration (µg/m^3)	Mass Removal (Lbs./Day)	Elapsed Days of Operation	Total Mass Removed	
5/1/2003	0	0.00	0	0	0	0	System not operational.
6/1/2003	0	0.00	0	0	0	0	System not operational.
7/1/2003	0	0.00	0	0	0	0	System not operational.
8/1/2003	0	0.00	0	0	0	0	System not operational.
9/1/2003	0	0.00	0	0	0	0	System not operational.
10/1/2003	0	0.00	0	0	0	0	System not operational.
11/1/2003	0	0.00	0	0	0	0	System not operational.
12/1/2003	0	0.00	0	0	0	0	System not operational.
1/1/2004	0	0.00	0	0	0	0	System not operational.
2/1/2004	0	0.00	0	0	0	0	System not operational.
3/1/2004	0	0.00	0	0	0	0	System not operational.
4/1/2004	0	0.00	0	0	0	0	System not operational.
4/28/2004	0	0.00	0	0	0	0	System startup.
5/5/2004	80	2.27	2600	0.02	7	0.13	Sample IDs switched - use sample from 13:30 pm, per M. Allen, SAS.
5/13/2004	74	2.10	2600	0.02	8	0.14	Data ssumed from 5/5/04.
5/19/2004	77	2.18	2600	0.02	6	0.11	Data ssumed from 5/5/04.
5/27/2004	77	2.18	2600	0.02	8	0.14	Data ssumed from 5/5/04.
6/1/2004	75	2.12	3500	0.02	5	0.12	
6/9/2004	78	2.21	3500	0.02	8	0.20	Data ssumed from 6/1/04.
6/17/2004	78	2.21	3500	0.02	8	0.20	Data ssumed from 6/1/04.
6/24/2004	82	2.32	3500	0.03	7	0.18	Data ssumed from 6/1/04.
7/1/2004	78	2.21	9400	0.07	7	0.46	
7/8/2004	79	2.24	9400	0.07	7	0.47	Data ssumed from 7/1/04.
7/15/2004	77	2.18	9400	0.06	7	0.45	Data ssumed from 7/1/04.
7/22/2004	73	2.07	9400	0.06	7	0.43	Data ssumed from 7/1/04.
7/29/2004	74	2.10	9400	0.06	7	0.44	Data ssumed from 7/1/04.
8/4/2004	72	2.04	BDL	0.00	6	0.00	
8/12/2004	68	1.93	BDL	0.00	8	0.00	Data ssumed from 8/4/04.
8/19/2004	68	1.93	BDL	0.00	7	0.00	*Data assumed from 8/4/04. System* Operations terminated on 8/19/04.
9/1/2004	0	0.00	0	0.00	0	0.00	System not operational.
10/1/2004	0	0.00	0	0.00	0	0.00	System not operational.

FLOW RATE =
(FLOW)x0.02832
(cfm)x(conv. to meters)

MASS REMOVAL =
(FLOW)x(CONC.)x1440x2.2x1E-09
(m3/min)x(ug/m3)x(min/day)x(lbs/kg)x(kg/ug)

TOTAL MASS =
(MASS REMOVAL)x(DAYS)

MPA AIR EMISSIONS DATA
POST-CARBON
5/1/04 THROUGH 10/31/04 REPORTING PERIOD

Vinyl Chloride

Date	Air Flow	Flow Rate (m^3/min)	Concentration ($\mu g/m^3$)	Mass Removal (Lbs./Day)	Elapsed Days of Operation	Total Mass Removed	
5/1/2003	0	0.00	0	0	0	0	System not operational.
6/1/2003	0	0.00	0	0	0	0	System not operational.
7/1/2003	0	0.00	0	0	0	0	System not operational.
8/1/2003	0	0.00	0	0	0	0	System not operational.
9/1/2003	0	0.00	0	0	0	0	System not operational.
10/1/2003	0	0.00	0	0	0	0	System not operational.
11/1/2003	0	0.00	0	0	0	0	System not operational.
12/1/2003	0	0.00	0	0	0	0	System not operational.
1/1/2004	0	0.00	0	0	0	0	System not operational.
2/1/2004	0	0.00	0	0	0	0	System not operational.
3/1/2004	0	0.00	0	0	0	0	System not operational.
4/1/2004	0	0.00	0	0	0	0	System not operational.
4/28/2004	0	0.00	0	0	0	0	System startup.
5/5/2004	80	2.27	BDL	0.00	7	0.00	Sample IDs switched - use sample from 13:30 pm, per M. Allen, SAS.
5/13/2004	74	2.10	BDL	0.00	8	0.00	Data ssumed from 5/5/04.
5/19/2004	77	2.18	BDL	0.00	6	0.00	Data ssumed from 5/5/04.
5/27/2004	77	2.18	BDL	0.00	8	0.00	Data ssumed from 5/5/04.
6/1/2004	75	2.12	BDL	0.00	5	0.00	
6/9/2004	78	2.21	BDL	0.00	8	0.00	Data ssumed from 6/1/04.
6/17/2004	78	2.21	BDL	0.00	8	0.00	Data ssumed from 6/1/04.
6/24/2004	82	2.32	BDL	0.00	7	0.00	Data ssumed from 6/1/04.
7/1/2004	78	2.21	BDL	0.00	7	0.00	
7/8/2004	79	2.24	BDL	0.00	7	0.00	Data ssumed from 7/1/04.
7/15/2004	77	2.18	BDL	0.00	7	0.00	Data ssumed from 7/1/04.
7/22/2004	73	2.07	BDL	0.00	7	0.00	Data ssumed from 7/1/04.
7/29/2004	74	2.10	BDL	0.00	7	0.00	Data ssumed from 7/1/04.
8/4/2004	72	2.04	110	0.00	6	0.00	
8/12/2004	68	1.93	110	0.00	8	0.00	Data ssumed from 8/4/04.
8/19/2004	68	1.93	110	0.00	7	0.00	Data assumed from 8/4/04. System Operations terminated on 8/19/04.
9/1/2004	0	0.00	0	0.00	0	0.00	System not operational.
10/1/2004	0	0.00	0	0.00	0	0.00	System not operational.

FLOW RATE =
(FLOW)x0.02832
(cfm)x(conv. to meters)

MASS REMOVAL =
(FLOW)x(CONC.)x1440x2.2x1E-09
(m3/min)x(ug/m3)x(min/day)x(lbs/kg)x(kg/ug)

TOTAL MASS =
(MASS REMOVAL)x(DAYS)

CARRIER COLLIERVILLE-WATER PLANT #2

TCE Data Results for City Wells CWE and CWW

Date	CWE (ppb)	CWE Avg.	CWW (ppb)	CWW Avg.	Notes:
06-Jun-90	0		22		
21-Aug-90	9		27		
19-Nov-90	28	12	45	31	
13-Apr-91	39	25	120	64	
19-Apr-91	20.41	29	102.5	89	
19-Nov-91	11	23	79	101	
15-May-92	48	26	130	104	
21-May-92	48	36	150	120	
28-May-92	55	50	120	133	
04-Jun-92	45	49	220	163	
11-Jun-92	47	49	140	160	
23-Jun-92	43	45	110	157	
10-Jul-92	48	46	120	123	
15-Jul-92	46	46	110	113	
23-Jul-92	45	46	110	113	
30-Jul-92	47	46	74	98	
06-Aug-92	48	47	140	108	
13-Aug-92	47	47	114	109	
20-Aug-92	46	47	120	125	
03-Sep-92	40	44	110	115	
08-Oct-92	34	40	110	113	
14-Oct-92	39	38	120	113	
22-Oct-92	33	35	110	113	
29-Oct-92	38	37	120	117	
31-Dec-92	19	30	130	120	
22-Jan-93	25	27	140	130	
27-Jan-93	30	25	160	143	
03-Feb-93	23	26	130	143	
11-Feb-93	34	29	110	133	
17-Feb-93	140	66	150	130	
25-Feb-93	26	67	120	127	
03-Mar-93	22	63	130	133	
10-Mar-93	17	22	140	130	
17-Mar-93	8.9	16	130	133	
24-Mar-93	13	13	130	133	
18-May-93	35	19	130	130	
21-Jun-93	31	26	120	127	
22-Jul-93	21	29	120	123	
08-Sep-93	9.3	20	130	123	
11-Oct-93	13	14	180	143	
11-Nov-93	13	12	180	163	
20-Dec-93	13	13	150	170	
16-Jun-94	28	18	110	147	
19-May-95	79	40	100	120	
21-Sep-95	81	63	94	101	
06-Dec-95	98	86	120	105	
20-Mar-96	130	103	100	105	
25-Jun-96	62	97	90	103	
25-Sep-96	63	85	120	103	
26-Nov-96	88	71	140	117	
11-Mar-97	94	82	170	143	
10-Jun-97	92.9	92	193	168	
23-Sep-97	96	94	180	181	
04-Dec-97	91	93	170	181	
05-Mar-98	97	95	156	169	
18-Jun-98	99	96	170	165	
17-Dec-98	80	92	170	165	
04-Mar-99	86	88	160	167	
22-Jun-99	91	86	160	163	
21-Sep-99	61	79	170	163	
12-Nov-99	78	77	150	160	
22-Feb-00	82	74	150	157	
06-Jun-00			180	160	NS = Not Sample
21-Sep-00	76	79	150	160	
04-Dec-00	91	84	130	153	
29-Mar-01	100	89			Note CWW down during 1Q2001; NS = Not San
14-Jun-01	69	87			Note CWW down during 2Q2001; NS = Not San
25-Oct-01	97	89	180	153	
12-Dec-01	130	99	190	167	
18-Mar-02	95	107	220	197	
21-May-02	99	108	140	183	
02-Oct-02	120	105	160	173	
26-Nov-02	140	120	140	147	
01-Apr-03	160	140	160	153	
01-Jul-03	170	157	110	137	
24-Sep-03	170	167	130	133	

Water Plant #2 Flow Data

Month	Gallons (gal)	Quarterly Summary	Quarterly Total (gal)	Annual Total (gal)
Jan-00	32,410,000			
Feb-00	30,379,000			
Mar-00	29,794,000	1Q00	92,583,000	
Apr-00	31,543,000			
May-00	32,606,000			
Jun-00	25,395,000	2Q00	89,544,000	
Jul-00	31,642,000			
Aug-00	36,849,000			
Sep-00	35,692,000	3Q00	104,183,000	
Oct-00	36,324,000			
Nov-00	32,142,000			
Dec-00	33,415,000	4Q00	101,881,000	388,191,000
Jan-01	33,116,000			
Feb-01	27,408,000			
Mar-01	31,280,000	1Q01	91,804,000	
Apr-01	31,426,000			
May-01	37,575,000			
Jun-01	36,498,000	2Q01	105,499,000	
Jul-01	37,193,000			
Aug-01	36,541,000			
Sep-01	33,584,000	3Q01	107,318,000	
Oct-01	34,732,000			
Nov-01	33,838,000			
Dec-01	30,460,000	4Q01	99,030,000	403,651,000
Jan-02	34,034,000			
Feb-02	19,702,000			
Mar-02	34,264,000	1Q02	88,000,000	
Apr-02	32,861,000			
May-02	33,693,000			
Jun-02	30,406,000	2Q02	96,960,000	
Jul-02	33,333,000			
Aug-02	37,934,000			
Sep-02	35,040,000	3Q02	106,307,000	
Oct-02	33,169,000			
Nov-02	30,979,000			
Dec-02	33,067,000	4Q02	97,215,000	388,482,000
Jan-03	32,461,000			
Feb-03	29,592,000			
Mar-03	18,162,000	1Q03	80,215,000	
Apr-03	20,922,000			
May-03	29,431,000			
Jun-03	33,627,000	2Q03	83,980,000	
Jul-03	35,690,000			
Aug-03	35,117,000			
Sep-03	32,892,000	3Q03	103,699,000	
Oct-03	29,364,000			
Nov-03	30,705,000			
Dec-03	3,208,000	4Q03	63,277,000	331,171,000

East Well Quarter	East Well TCE Avg (Moving) (ug/L)	Total Flow (MG)	East Well Flow (1/2 total) gallons	East Well Flow (1/2 total) liters	Mass Removed (kg)	Mass Removed (lbs)	Notes
1Q2000	74	92,583,000	46,291,500	175,907,700	13.0	28.5	
2Q2000	0	89,544,000	44,772,000	170,133,600		0.0	Note EW down during 2Q2000
3Q2000	79	104,183,000	52,091,500	197,947,700	15.6	34.3	
4Q2000	84	101,881,000	50,940,500	193,573,900	16.2	35.6	
1Q2001	89	91,804,000	91,804,000	348,855,200	31.0	68.3	Note WW down during 1Q2001
2Q2001	87	105,499,000	105,499,000	400,896,200	34.7	76.4	Note WW down during 2Q2001
3Q2001	89	107,318,000	53,659,000	203,904,200	18.1	39.8	
4Q2001	99	99,030,000	49,515,000	188,157,000	18.6	40.8	
1Q2002	107	88,000,000	44,000,000	167,200,000	17.9	39.5	
2Q2002	108	96,960,000	48,480,000	184,224,000	19.9	43.8	
3Q2002	105	106,307,000	53,153,500	201,983,300	21.1	46.5	
4Q2002	120	97,215,000	48,607,500	184,708,500	22.1	48.6	
1Q203	140	80,215,000	40,107,500	152,408,500	21.3	46.9	
2Q2003	157	83,980,000	41,990,000	159,562,000	25.0	55.0	
3Q2003	167	103,699,000	51,849,500	197,028,100	32.8	72.2	
4Q2003	167	63,277,000	31,638,500	120,226,300	20.1	44.2	assume concentration from 3Q2003 is still OK
						720.4	

Mass calculation = gallons removed x concentration (ug/L) x (3.8 L/gal) x (1 kg/ 1xE-09 ug) x (2.2 lbs/kg)

West Well Quarter	West Well TCE Avg (Moving) (ug/L)	Total Flow (MG)	West Well Flow (1/2 total) gallons	West Well Flow (1/2 total) liters	Mass Removed (kg)	Mass Removed (lbs)	Notes
1Q2000	157	92,583,000	46,291,500	175,907,700	27.6	60.6	
2Q2000	160	89,544,000	44,772,000	170,133,600	27.2	59.9	Note EW down during 2Q2000
3Q2000	160	104,183,000	52,091,500	197,947,700	31.7	69.7	
4Q2000	153	101,881,000	50,940,500	193,573,900	29.7	65.3	
1Q2001	0	91,804,000	45,902,000	174,427,600		0.0	Note WW down during 1Q2001
2Q2001	0	105,499,000	52,749,500	200,448,100		0.0	Note WW down during 2Q2001
3Q2001	153	107,318,000	53,659,000	203,904,200	31.3	68.8	
4Q2001	167	99,030,000	49,515,000	188,157,000	31.4	69.0	
1Q2002	197	88,000,000	44,000,000	167,200,000	32.9	72.3	
2Q2002	183	96,960,000	48,480,000	184,224,000	33.8	74.3	
3Q2002	173	106,307,000	53,153,500	201,983,300	35.0	77.0	
4Q2002	147	97,215,000	48,607,500	184,708,500	27.1	59.6	
1Q203	153	80,215,000	40,107,500	152,408,500	23.4	51.4	
2Q2003	137	83,980,000	41,990,000	159,562,000	21.8	48.0	
3Q2003	133	103,699,000	51,849,500	197,028,100	26.3	57.8	
4Q2003	133	63,277,000	31,638,500	120,226,300	16.0	35.2	assume concentration from 3Q2003 is still OK
						868.9	

Mass calculation = gallons removed x concentration (ug/L) x (3.8 L/gal) x (1 kg/ 1xE-09 ug) x (2.2 lbs/kg)

Appendix E
May 8, 2003 Correspondence
WP#2 Temporary Shutdown

ENSAFE

EnSafe Inc. Environmental and Management Consultants

5724 Summer Trees Drive • Memphis, Tennessee 38134 • Telephone 901-372-7962 • Facsimile 901-372-2454 • www.ensafe.com

By Electronic Mail and Federal Express

May 8, 2003

Ms. Beth Walden
Remedial Project Manager
USEPA Region 4
61 Forsyth Street, S.W
Atlanta, GA30303-8960

Subject: Carrier Air Conditioning Superfund Site: Notice of Potential for Delay in Performance of the Groundwater Remedy

This letter confirms the oral notice we provided you on Thursday May 1, 2003, as required by Section XXII, Paragraph B of the Unilateral Administrative Order for Remedial Design and Remedial Action for the subject site.

In this letter we provide the following information:

- A description of the nature of the delay
- Explanation of the reason the delay is beyond Carrier's control
- Schedule outlining measures being and to be taken by Carrier to mitigate the effect of the delay

Nature of the Delay

EnSafe was informed verbally last week that the West well of the Collierville Water Plant 2 was removed from service on March 10, 2003. According to Tim Overly, Collierville Public Works Director, this was done because the samples of raw water from the well have been analyzed to contain increasing concentrations of chromium, most recently at a 65 microgram/liter level, which is 65% of the Safe Drinking Water Maximum Contaminant Level.

According to Mr. Overly, the Tennessee Department of Environment and Conservation Division of Water Supply has directed Collierville to discontinue pumping from the West well when water from the well reaches 80% of the chromium Maximum Contaminant Level, resample in the following quarter, and reassess operation. Collierville elected to stop pumping the well in advance of that condition.

Because pumping of this well is a component of the subject remedy, with the objective of containing and treating trichloroethene in groundwater, we are notifying EPA of the potential for a delay in attaining site objectives, as required by the Unilateral Administrative Order.

Our initial assessment is that there is no immediate endangerment, because migration of trichloroethene in the Memphis Sand aquifer is a slow process, and because the East well continues to be operated at nearly its rated capacity. The most recent sample of water from the East well does not contain detectible chromium (according to Collierville), so we have reason to expect that some groundwater extraction at the Water Plant will be continued without interruption. We provide this notice only because our remedial design was predicated on operation of both wells at a combined rate of 1.1 million gallons per day, and the East well reportedly is being operated at about 0.7 million gallons per day.

Delay Beyond Control of Carrier

The contamination of the West well by chromium is a condition that was not caused by Carrier, and was unexpected by Collierville. The fact that the well was out of service was unreported to Carrier until April 29, 2003, although the shut down occurred on March 10, 2003, 50 days earlier. Collierville and Carrier are parties to an agreement that, among other things, requires that Collierville to inform Carrier 30 days in advance of any planned shutdown and within 24 hours of any unscheduled shutdown. In addition, the agreement provides that Collierville cannot remove the West well from production for more than two consecutive weeks.

Both the well shutdown and the delay in reporting the shutdown to EPA were beyond the control of Carrier. Therefore, any potential for delay in performance of remedy obligations is also beyond the control of Carrier.

Implementation Schedule

Carrier has begun gathering information to determine how best to respond. We have scheduled for Thursday, May 8th a meeting with Collierville representatives to gather additional facts and to continue the process of assessing alternatives. Once we have had the opportunity to gather facts about current conditions and available alternatives, we will contact you to provide EPA with a more detailed plan of action.

If you have any questions or concerns regarding our efforts to resolve this issue, please do not hesitate to contact me or Lori Goetz at 901/372-7962.

Respectfully submitted,

EnSafe Inc., by

Craig Wise, PE

Copy: Tim Overly, Collierville Public Works
Maude McGraw, Carrier Collierville
Bryan Kielbania, UTC Shared Services – Remediation

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Appendix F
ATSDR Health Consultation, Smalley-Piper Site

Health Consultation

Smalley-Piper
EPA ID No. TNN000407378

Collierville, Shelby County, Tennessee

ATSDR
AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY

Prepared by

Department of HEALTH

Tennessee Department of Health
Under a Cooperative Agreement with
The Agency for Toxic Substances and Disease Registry

Background and Statement of Issues

In July 2003, Tennessee Department of Health (TDH) Environmental Epidemiology (EEP) was asked to provide a written public health consultation for the Smalley-Piper site in Collierville, Shelby County, Tennessee. Mr. Femi Akindele, US Environmental Protection Agency (EPA), contacted Mr. Robert Safay of the Agency for Toxic Substances and Disease Registry's (ATSDR) Office of Regional Operations. ATSDR referred the environmental public health question to its cooperative agreement partner, TDH. More than once, water samples from monitoring wells at the site exceeded the EPA regulated maximum contaminant level (MCL) of 100 parts per billion (ppb) of total chromium for drinking water (WSI 2002). There is concern that this chromium pollution in groundwater may cause chromium concentrations in the Town of Collierville's Department of Public Services drinking water to be a health concern.

The Smalley-Piper CERCLA site is located at 695 US Highway 72 W in a business area of Collierville, zip code 38017 (Figure 1). Presently, the site is operated by Piper Industrial Coating, which is engaged in the business of hardfacing and recycling farm equipment (Figures 2 and 3). Hardfacing applies heated iron slurry to carbon steel plows and disks to strengthen the tools in areas that are susceptible to wear and tear (WSI 2002). No hazardous materials are thought to be used in current processes. The site began making farm tools in the 1960s. Ownership and manufacturing processes both changed several times over the years. In the early 1970s, site operations moved to the manufacturing of magnesium battery casings (EPA 2002).

During the manufacturing process, the magnesium battery casings went through a treatment train consisting of ten vats each equipped with leakage (prevention) baskets. The ten-step process consisted of: 1) caustic soda, 2) rinse water, 3) rinse water, 4) acetic acid, 5) rinse water, 6) rinse water, 7) chromic acid, 8) rinse water, 9) rinse water, and 10) boiling rinse water.

The entire treatment train was surrounded by a concrete berm to contain spills. The rinse water used in the treatment process came from an on-site production well. The production well still exists, but it is no longer used. The process wastes were discharged on-site into an open, lined equalization pond. The volume of rinse water, combined with caustic soda, acetic acid, and sodium nitrate, was estimated to be 28,000 gallons per day. The chromic acid was changed after approximately 4,000 battery casings were processed; 200–300 casings were processed at a time.

In theory, mixing the caustic soda and acetic acid could yield a neutralization reaction. After being discharged into the equalization pond, the spent chromic acid was treated by injecting liquid sulfur dioxide (SO_2) from a pressure, bullet tank directly into the pond. The pond was reported to be tested twice weekly by the plant chemist. SO_2 and pH adjustments were made as necessary. The goal was to remove hexavalent chromium(VI) present in the chromic acid as a sulfide precipitate containing trivalent chromium(III). The chemical reaction would be:

$$2CrO_3\ [\text{chromium(VI)}] + 3SO_2 \rightarrow Cr_2S_3\ [\text{chromium(III)}] + 6O_2$$

In 1981–82, the magnesium casing operations, including equipment and monitoring reports, were moved to another site in New Albany, Mississippi. When the manufacturing stopped, the

Tennessee Department of Environment and Conservation (TDEC) conducted oversight during the closing of the equalization pond. Pond sediment was removed and spread on plastic sheets. The blue tarpaulin pond liner was hauled away for disposal. The pond contents were turned over, mixed with a red sand, and allowed to dry. When the State was satisfied with the analytical results from its testing activities, the contents were put back into the now-unlined equalization pond area, covered with soil, and seeded (WSI 2002).

The Smalley-Piper site is underlain by alluvial deposits of approximately 50-foot thickness. The alluvial deposits consist of sand, clay, and gravel. Underlying the alluvial deposits is Memphis Sand. The Memphis Sand is a 700–800 foot thick formation of sand with clay lenses that serves as the primary drinking water aquifer for the Memphis area east of the Mississippi River. Groundwater flow in the area is generally westward toward the river (EPA 2002).

In March 2001, surface water flowing onto a potential subdivision site northeast of Smalley-Piper was discovered to contain 153 parts of total chromium per billion parts of water (ppb). In April 2001, the previously mentioned on-site production well and the surface water drainage ditch were sampled. Concentrations of total chromium of 141 ppb and 139 ppb, respectively, were measured. Until this discovery, the Smalley-Piper site was believed to have been successfully remediated. These results led to testing 11 groundwater wells in July 2002. The 11 wells supply all five of the Town of Collierville's Department of Public Services public drinking water plants. Together the five plants service approximately 12,000 connections (EPA 2002).

From the July 2002 testing, two groundwater wells, located west of Smalley-Piper (WSI 2002), were reported to have detectable total chromium levels. These wells, 201 and 202, are used by the Town of Collierville Water Plant #2. During the same time period, the Smalley-Piper on-site production well and the surface water drainage ditch were sampled again. Total chromium concentrations reported were 93 ppb and 89 ppb, respectively. With the increasing evidence of chromium pollution, periodic chromium testing at Collierville Water Plant #2 was mandated.

Chromium has frequently been detected in Town of Collierville source water wells numbered 201 and 202, total chromium levels ranged from non-detect to 74 ppb in these wells. The chromium levels have always been below the EPA maximum contaminant level (MCL) of 100 ppb. Furthermore, water from well 201 is mixed with water from well 202 prior to public distribution. This action dilutes the chromium concentration in the water supply. Total chromium concentrations in drinking water distributed to the public ranged from non-detect to 43 ppb between July 20, 2001 and October 7, 2003. Once again, these levels were below the EPA MCL of 100 ppb. As of November 2003, both wells 201 and 202 were in operation at Water Plant #2. Water Plant #2 draws 1.5 million gallons of groundwater per day (MGD), which is 8.0% of Collierville's total demand.

The land use of the area surrounding the Smalley-Piper site has changed since the manufacturing of the magnesium battery casings in the 1970s ended. Figures 2, 3, and 4 depict new businesses, including stores and restaurants now present in the area.

Discussion

Environmental Sampling

Chromium pollution discovered in March 2001 near the Smalley-Piper site led to sampling groundwater in the on-site production well and surface water drainage ditch in April and July 2001. Table 1 provides the results of the sampling.

TABLE 1. On-site chromium in water analysis (ppb) conducted April and July 2001 for Smalley-Piper, Collierville, Shelby County, Tennessee.

	on-site production well		surface water drainage ditch	
	April 2001	July 2001	April 2001	July 2001
chromium(VI)	not measured	76	not measured	75
Total chromium	141	93	139	89

An EPA site investigation (SI) was conducted at Smalley-Piper the week of July 8, 2002. Three groundwater monitoring wells were installed during the SI. The on-site production well was also sampled in duplicate. The wells were sampled for volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), pesticides/PCBs, metals, and cyanide. Various compounds were identified and measured in small quantities (EPA 2002). Table 2 shows that one of the four wells contained an elevated concentration of total chromium. The 250 ppb total chromium measured in well SP02GW is markedly greater than the 100 ppb MCL. A potable water sample (i.e., a blank) was collected to facilitate further evaluation in case contamination was introduced by the use of the municipally supplied water as drilling fluid (EPA 2002).

TABLE 2. Total chromium values (ppb) measured in groundwater monitoring wells during the July 2002 EPA SI at the Smalley-Piper site, Collierville, Shelby County, Tennessee.

SP01GW	SP02GW	SP03GW	SP04GW on-site well	SP04GW duplicate	SP05PW potable blank
13	250	14	20	16	not detected

As a precaution, the Town of Collierville's Department of Public Services was required to perform periodic monitoring of the chromium concentration in its municipal water sources and finished drinking water supply. Results of samples collected from two groundwater wells and finished drinking water are presented in Table 3 (TOC 2003).

TABLE 3. Total chromium and hexavalent chromium(VI) concentrations (ppb) measured in the Town of Collierville's Department of Public Services Plant #2 source water wells and finished drinking water, July 20, 2001 to October 7, 2003, Shelby County, Tennessee (TOC 2003).

	East Well #201		West Well #202		Plant #2 – finished drinking water	
Date	Total Cr	hexavalent	total Cr	hexavalent	total Cr	hexavalent
7/20/01	15	15			<9	<10
8/02/01	19	21	8	10	15	12
10/22/01		20		20		
1/16/02		20		26		
4/10/02		14		26		
7/16/02		<10		42		
8/07/02			41	41	26	28
8/26/02		<10		46		30
10/29/02		10		50		20
1/27/03	<9	15	10	73	21	46
1/30/03	<9	<10	65	56	27	23
2/06/03	7	<10	66	63	18	13
3/04/03	6	<10	70	60	26	30
4/28/03	<10	<10	<10	<10	<10	<10
5/05/03	8	<50	9	<50	8	<50
5/19/03	10		58		34	
5/27/03	11	<10	60	43	38	32
5/27/03		<9		53		31
6/26/03	13		73		42	
7/31/03	16		74		43	
8/29/03	12		74		40	
9/17/03	13		70		40	
10/07/03	12		73		40	

Although the chromium concentrations measured in the groundwater wells and the finished drinking water are below the EPA MCL of 100 ppb, both total chromium and hexavalent chromium(VI) concentrations have increased over time. Currently, the West Well #202 has the highest levels of chromium. Controls are already in place to ensure that both wells are drawn from at the same time in order to mix the source waters and thus dilute the total chromium concentration. If either well shuts down or if there is a loss in amperage, then the entire water plant is designed to shut down to prevent the west well from operating alone. Town of Collierville Water Plant #2 draws 1.5 million gallons of groundwater per day, with a pump rate of 550 gallons per minute (WSI 2002). Of the five water plants operated by the Town of Collierville, Water Plant #2 is by far the smallest volume plant. A voluntary total chromium level of 50 ppb in finished drinking water, more conservative than the EPA enforceable MCL of 100 ppb, was established by the Department of Public Services as a shutdown level. This level is based on the state of California's total chromium MCL of 50 ppb.

Private Drinking Water Wells

According to the EPA site investigation, 83 private wells exist within 1 mile of the Smalley-Piper site (WSI 2002). It is unlikely that these private wells have been tested for chromium. According to the Memphis-Shelby County Health Department, it is unlikely that these wells serve as residential drinking water wells. The area of Collierville in question was reported to have had municipal drinking water available for 10–15 years. Homeowners were given 1 year to connect to municipal water once available. Therefore, no residents are thought to be drinking water from a private well. No private well data were reviewed in preparing this document.

Chromium

A naturally occurring element, chromium is found in rocks, animals, plants, soil, and volcanic dust and gases. Chromium can be found in different forms in the environment. The three most common forms of chromium are elemental chromium(0), trivalent chromium(III), and hexavalent chromium(VI). The metal chromium(0) does not occur naturally and, thus, is uncommon. Chromium(III) is an essential nutrient that helps the human body use sugar, protein, and fat. Hexavalent chromium(VI) is produced by industrial processes (ATSDR 2000).

Chromium compounds have no known odor or taste. Elemental chromium(0) is a grey solid metal with a high melting point. It is used in making steel and other metal alloys. The naturally occurring mineral chromite in the chromium(III) form is used as lining in high-temperature industrial furnaces, in other chemical compounds, and in metal alloys. Chromium(III) and chromium(VI) are used to make chrome metal plating. In addition, chromium(III) and chromium(VI) are used in the manufacture of dyes and pigments, in the tanning of leather, and in wood preserving products (ATSDR 2000).

Drinking chromium-polluted water was the pathway into the human body focused on in preparation of this health consultation. Chromium(0) is not currently believed to cause a serious health risk to humans. Ingestion of hexavalent chromium(VI) at levels greater than those found thus far in Collierville has been shown to damage the kidneys in several studies. A 1965 study in the People's Republic of China where villagers drank water with 20,000 ppb chromium(VI) resulted in oral ulcers, diarrhea, abdominal pain, indigestion, and vomiting. Medical and laboratory studies suggest that hexavalent chromium(VI) has the greatest potential to cause adverse health effects in people and laboratory animals. The public water supply from the Town of Collierville Water Plant #2 was periodically measured for both total chromium and hexavalent chromium(VI) concentrations. Typically, the amount of hexavalent chromium(VI) dominated the total chromium concentration measurement.

According to the International Agency for Research on Cancer (IARC), chromium(0) and chromium(III) are not classifiable as to their carcinogenicity. EPA has insufficient evidence that chromium(VI) in food or water causes cancer. For the oral exposure route, chromium(VI) is classified as Group D, not classifiable as to human carcinogenicity (ATSDR 2000). No reliable information exists that suggests chromium in any form has harmful effects on reproduction or

causes birth defects in humans. However, birth defects have been observed in laboratory animals exposed to chromium(VI) (ATSDR 2000).

Children's Health Considerations

In communities faced with air, water, or food contamination, the many physical differences between children and adults demand special emphasis. Children could be at greater risk than adults from certain kinds of exposure to hazardous substances. Children have lower body weights than adults. Yet, children drink a larger volume of water per mass of body weight than adults. Therefore, a child's lower body weight and higher intake rate results in a greater dose of chromium per unit of body weight. If toxic exposure levels are high enough during critical growth stages, the developing body systems of children can sustain permanent damage. Finally, children are dependent on adults for access to housing, for access to medical care, and for risk identification. Thus, adults need as much information as possible to make informed decisions regarding their children's health.

The most important difference in the evaluation of the threat to children and adults who might consume chromium-polluted drinking water resides in the use of the EPA maximum contaminant level versus ATSDR comparison values. The EPA MCL of 100 ppb total chromium is the regulatory standard. This standard assumes a greater ratio of chromium(III) to chromium(VI) in the drinking water than what has been measured at Water Plant #2. Table 3 shows that most of the chromium measured in Water Plant #2 is hexavalent chromium(VI). ATSDR hexavalent chromium(VI) screening levels for intermediate exposure, 15 to 364 days, for increased non-cancer adverse health effects are different for adults and for children. The reference dose media evaluation guide (RMEG) for adults exposed to an intermediate duration of hexavalent chromium(VI) in drinking water is 100 ppb. This value is similar to the EPA MCL for total chromium. For children, ATSDR has set the intermediate RMEG for chromium(VI) in drinking water at 30 ppb. The finished product drinking water data in Table 3 shows that the screening level of 30 ppb hexavalent chromium(VI) has been slightly exceeded each month since May 2003. The 30 ppb RMEG for children is a screening value only. Exceedances of this RMEG do not imply health affects are occurring, especially since these levels have been detected for a short time frame and because the water from Plant # 2 is blended with other water throughout the municipal water system.

ATSDR's RMEG is based on EPA's reference dose (RfD) for chromium(VI) of 0.003 mg/kg-day. This RfD has a combination of uncertainty and modifying factors totaling 900. EPA's overall confidence in the RfD is low. The Town of Collierville has voluntarily decided to stop using Water Plant #2 if the finished drinking water has 50 ppb total chromium. Given the low confidence in EPA's RfD and large safety factor (900) used in establishing the RfD, 50 ppb total chromium, used by the State of California, is likely to be as protective as ATSDR's RMEG.

Conclusions

1. No apparent pubic health hazard exists for consumption of water supplied by the Town of Collierville's Department of Public Services Water Plant #2, Shelby County, Tennessee.

2. An indeterminate future public health hazard exists. If the chromium concentration in finished drinking water continues to increase, the result could be a public health hazard.

3. Private groundwater wells are no longer used for drinking water in Collierville.

Recommendations

1. Continue to monitor the total chromium and hexavalent chromium(VI) concentrations in well numbers 201 and 202 and the finished drinking water product at Water Plant #2.

2. If the hexavalent chromium(VI) concentration remains consistently over 30 ppb in finished drinking water, then additional chromium-reduction procedures should be implemented to protect children's health.

3. If the total chromium concentration in finished drinking water exceeds the voluntary contaminant level of 50 ppb, then the Department of Public Services should stop using Water Plant #2 to protect public health.

Public Health Action Plan

1. TDH EEP is available to review additional data and conduct a site visit.

2. TDH EEP will provide copies of this health consultation to the environmental regulatory agencies and concerned local residents.

3. TDH EEP will continue to provide health education to environmental regulatory agencies and community members concerned about the site.

4. TDH EEP will maintain dialogue with TDEC, EPA, and ATSDR until evidence exists that chromium pollution detected in the Town of Collierville, Shelby County, Tennessee, is not a potential environmental public health threat.

References

[ATSDR] Agency for Toxic Substances and Disease Registry. 2003. Water comparison values. Atlanta: US Department of Health and Human Services.

[ATSDR] Agency for Toxic Substances and Disease Registry. 1997. Healthy children—toxic environments. Report of the Child Health Workgroup presented to the Board of Scientific Counselors. Atlanta: US Department of Health and Human Services.

[ATSDR] Agency for Toxic Substances and Disease Registry. 1998. Promoting children's health—progress report of the Child Health Workgroup, Board of Scientific Counselors. Atlanta: US Department of Health and Human Services.

[ATSDR] Agency for Toxic Substances and Disease Registry. 2000. Toxicological profile for chromium. Atlanta: US Department of Health and Human Services.

[EPA] US Environmental Protection Agency. 2002. Memorandum: Well installation at Smalley-Piper Site, Collierville, Tennessee, SESD Project No. 02-0796. Nov. 19, 2002. Athens, GA: Region 4, Science and Ecosystem Support Division.

[TOC] Town of Collierville Department of Public Services. 2003. Letter from Timothy Overlay to Brain Caton, TDEC, concerning lab reports and chromium levels at Water Plant #2. July 16, 2002. Jackson, TN: Tennessee Department of Environment and Conservation.

[WSI] Weston Solutions, Inc. 2002. Engineering evaluation/cost analysis Smalley-Piper, Collierville, Shelby County, Tennessee – revision 1. Atlanta, GA: US Environmental Protection Agency.

Preparers of Report

Mr. David Borowski, Environmental Specialist
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Tennessee Department of Health (TDH)
Division of Communicable and Environmental Disease Services (CEDS)
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Reviewers of Report

Mr. Robert E. Safay, ATSDR Office of Regional Operations

Mr. Brian Caton, TDEC J-EAC Division of Water Supply

ATSDR Technical Project Officer

Mr. Alan Yarbrough
Division of Health Assessment and Consultation
Superfund Site Assessment Branch

FIGURE 1

Map detailing area around the Smalley-Piper site (695 US Highway 72 W).
Collierville, Shelby County, Tennessee, 38017 (Map credit: MapQuest.com 7/31/03)

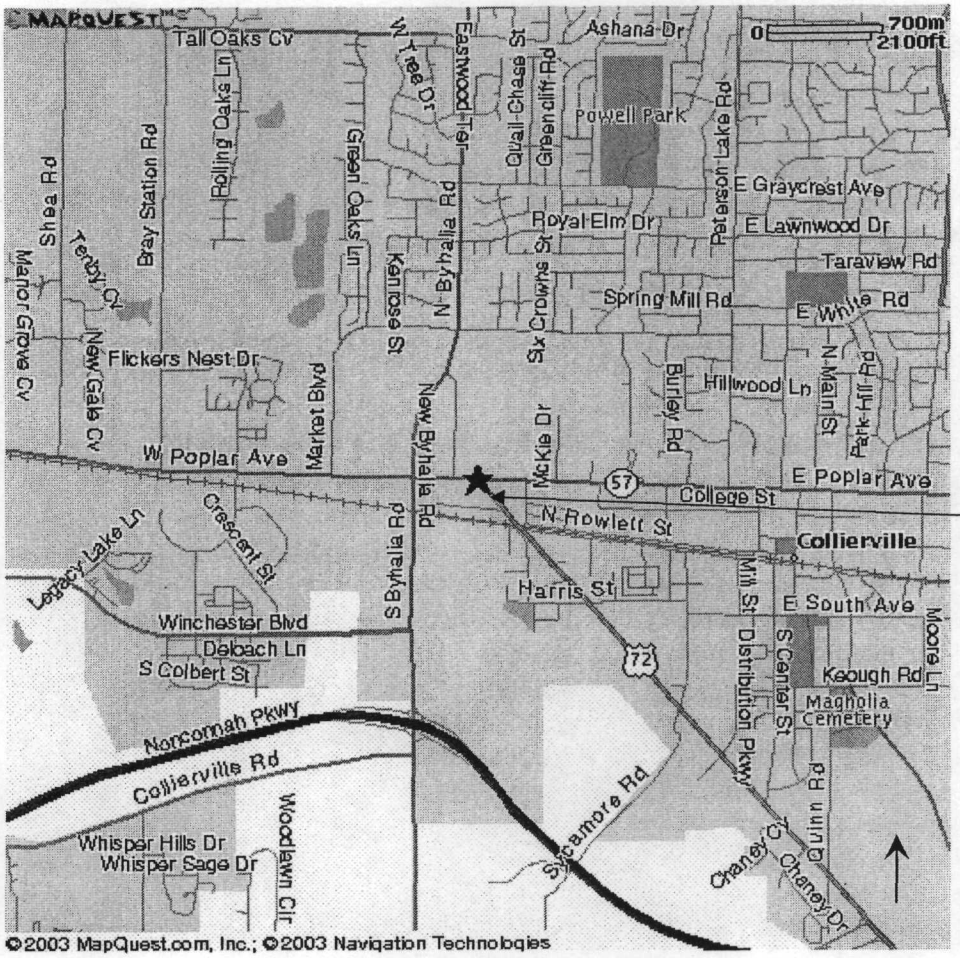


FIGURE 2
Photo of Piper Farm Products (a/k/a Smalley-Piper site).
Collierville, Sparta County, Tennessee (Photo credit: Robert E. Safay, ATSDR, 6/19/03)

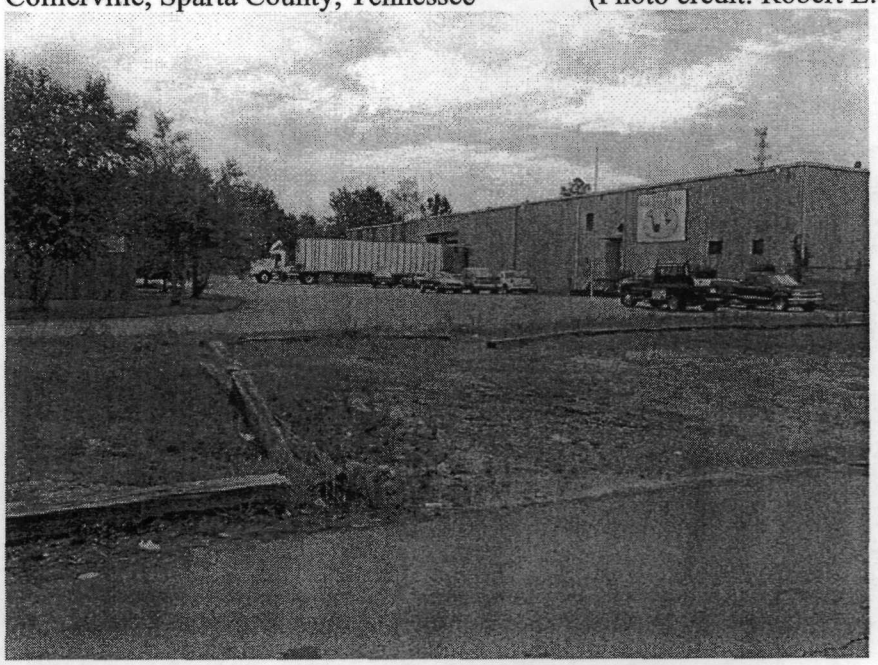


FIGURE 3
Photo of Smalley-Piper detailing businesses now operating in the former industrial area.
Collierville, Shelby County, Tennessee (Photo credit: Robert E. Safay, ATSDR, 6/19/03)

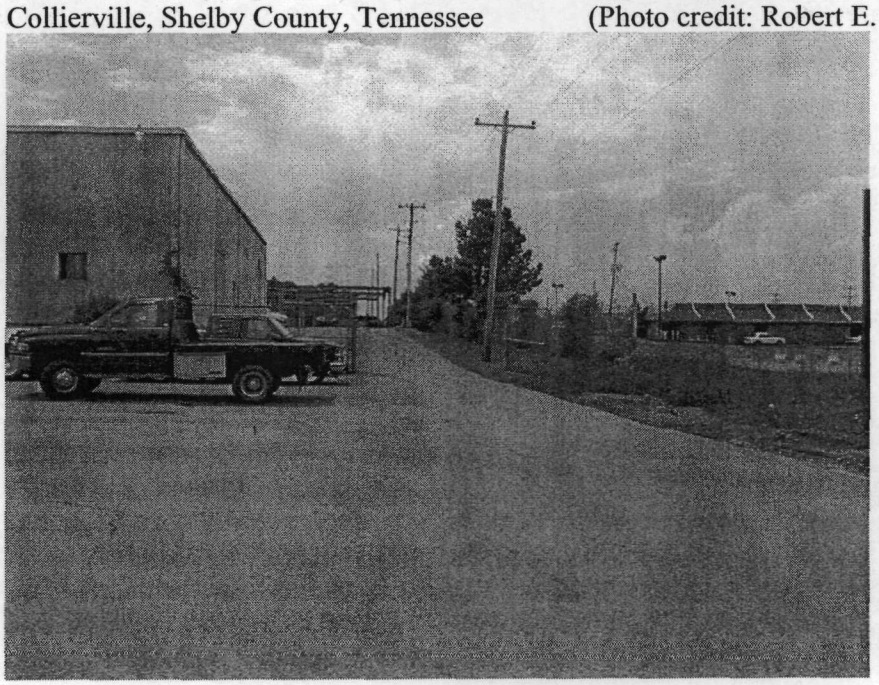


FIGURE 4

Photo of Raleigh Tire garage bays and storage.
Collierville, Shelby County, Tennessee (Photo credit: Robert E. Safay, ATSDR, 6/19/03)

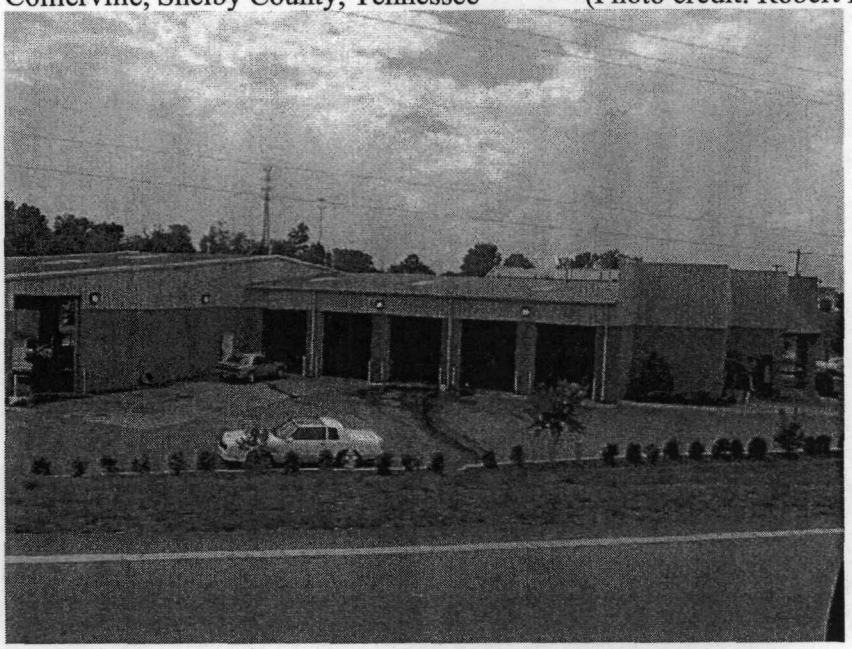
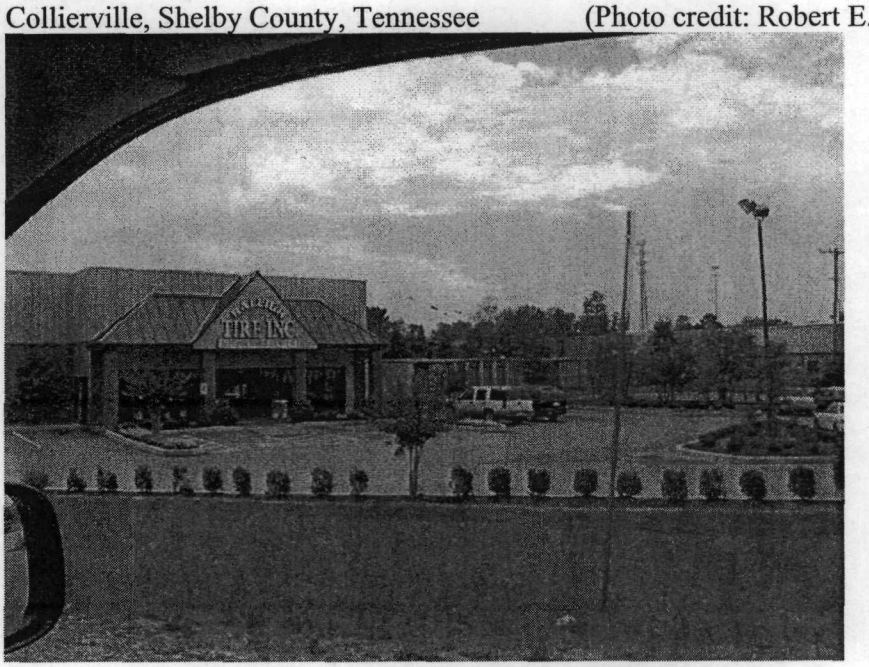


FIGURE 5

Photo of Raleigh Tire.
Collierville, Shelby County, Tennessee (Photo credit: Robert E. Safay, ATSDR, 6/19/03)



Certification

This Health Consultation: Smalley-Piper, Collierville, Shelby County, Tennessee, was prepared by the Tennessee Department of Health Environmental Epidemiology under a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR). It was prepared in accordance with the approved methodology and procedures that existed at the time the health consultation was begun.

Technical Project Officer, SPS, SSAB, DHAC, ATSDR

The Division of Health Assessment and Consultation, ATSDR, has reviewed this public health consultation and concurs with the findings.

Chief, State Program Section, SSAB, DHAC, ATSDR

FINAL DOCUMENT
ELECTRONIC FILE

Appendix G
October 30, 2003 Correspondence
Flow Rate Modulation

ENSAFE

ENSAFE INC. ENVIRONMENTAL AND MANAGEMENT CONSULTANTS

5724 Summer Trees Drive • Memphis, Tennessee 38134 • Telephone 901-372-7962 • Facsimile 901-372-2454 • www.ensafe.com

October 30, 2003 *By Electronic Mail and Federal Express*

Ms. Beth Walden
Remedial Project Manager
USEPA Region 4
61 Forsyth Street, S.W
Atlanta, GA30303-8960

Subject: Carrier Air Conditioning Superfund Site: Notice of Potential for Delay in Performance of the Groundwater Remedy

This letter confirms the oral notice we provided you via voice-mail on October 24, 2003, as required by Section XXII, Paragraph B of the Unilateral Administrative Order for Remedial Design and Remedial Action for the subject site.

In this letter we provide the following further information:

- A description of the nature of the delay
- An explanation of the reason the delay is beyond Carrier's control
- A schedule outlining measures being taken and to be taken by Carrier to mitigate the effect of the delay

Nature of the Delay

EnSafe was informed verbally on Friday, October 24, 2003 that the Town of Collierville has reduced the groundwater extraction rate from the West Well of Water Plant 2 (WP#2). According to Tim Overly, Collierville Public Works Director, this was done because the Tennessee Department of Health (TDH) has determined that chromium concentrations in excess of 30 micrograms per liter (µg/L) pose a threat to infants. At the suggestion of the Tennessee Department of Environment and Conservation (TDEC) Division of Water Supply, Collierville performed supplemental sampling in the distribution lines downstream of WP#2. Concentrations both along Byhalia Road and Schilling Farms quantified chromium in these lines at approximately 40 µg/L.

According to Mr. Overly, the Town of Collierville has elected to reduce flows from West Well, in an attempt to decrease the overall concentration of chromium in finished water. At this time, West Well flows have been reduced to 150 gallons per minute (gpm). East Well extraction rates are 550 gpm, for total WP#2 production rates of 680 gpm.

Because the pumping of the two wells that constitute WP#2's wellfield is a component of the subject remedy, with the objective of containing and treating trichloroethene in groundwater, we are notifying EPA of the potential for a delay in attaining site objectives, as required by the Unilateral Administrative Order. Our initial assessment is that there is no immediate endangerment, because migration of trichloroethene in the Memphis Sand aquifer is a slow

process. We provide this notice only because our remedial design, which was approved under the UAO, was predicated on operation of both wells at a combined rate of 1.1 million gallons per day, and total daily flows from WP#2 will not exceed 980,000 gallons under this reduced production rate scenario.

Delay Beyond Control of Carrier
The contamination of the West Well by chromium is a condition that was not caused by Carrier. Chromium concentrations in finished water (ranging from 40 to 45 µg/L) are well below the Federal Maximum Contaminant Level for chromium (100 µg/L). The 30 µg/L determination by TDH was unexpected, and subsequent actions taken by the Town of Collierville were beyond the control of Carrier. However, the Town of Collierville and Carrier are parties to an agreement to keep WP#2 operational, and Collierville is trying to maintain operation of West Well while meeting the concerns of the State of Tennessee.

Implementation Schedule
Carrier will monitor any changes in chromium concentration that may result from the flow reductions in West Well in its biweekly sampling program. If West Well contamination is being drawn from the East due to capture zone/flowpath "wraparound", chromium concentrations may decrease rapidly through flow rate reductions. The Town of Collierville and Carrier will then attempt to increase production rates from West Well until flowrates are maximized without exceeding the 30 µg/L criterion.

Once we have additional information, we will contact you to provide EPA with a more detailed plan of action.

If you have any questions or concerns regarding our efforts to resolve this issue, please do not hesitate to contact me at 901/372-7962.

Respectfully submitted,

EnSafe Inc.

By: Lori Anne Goetz
Project Manager

Copy: Tim Overly, Collierville Public Works
Maude McGraw, Carrier Collierville
Bryan Kielbania, UTC Shared Services – Remediation

Appendix H
December 10, 2003 Correspondence
Town of Collierville Shutdown of WP#2

ENSAFE

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5724 Summer Trees Drive • Memphis, Tennessee 38134 • Telephone 901-372-7962 • Facsimile 901-372-2454 • www.ensafe.com

December 10, 2003 *By Electronic Mail and Federal Express*

Mr. Femi Akindele
Remedial Project Manager
USEPA Region 4
61 Forsyth Street, S.W
Atlanta, GA30303-8960

Subject: Carrier Air Conditioning Superfund Site: Notice of Potential for Delay in Performance of the Groundwater Remedy

This letter confirms the oral notice we provided you via voice-mail on December 3, 2003, as required by Section XXII, Paragraph B of the Unilateral Administrative Order for Remedial Design and Remedial Action for the subject site.

In this letter we provide the following further information:

- A description of the nature of the delay
- An explanation of the reason the delay is beyond Carrier's control
- A schedule outlining measures being taken and to be taken by Carrier to mitigate the effect of the delay

Nature of the Delay
Bryan Kielbania of United Technologies (UTC) was informed verbally on Wednesday, December 3, 2003 that the Town of Collierville had shut down Water Plant 2 (WP#2). According to Tim Overly, Collierville Public Works Director, this was done because the administration of the Town of Collierville did not want to distribute public drinking water with chromium present at any concentration.

Because the pumping of the two wells that constitute WP#2's wellfield is a component of the subject remedy, with the objective of containing and treating trichloroethene (TCE) in groundwater, we are notifying EPA of the potential for a delay in attaining site objectives, as required by the Unilateral Administrative Order. Our initial assessment is that there is no immediate endangerment due to shut down, because migration of trichloroethene in the Memphis Sand aquifer is a slow process.

Delay Beyond Control of Carrier
The contamination of Water Plant #2 by chromium is a condition that was not caused by Carrier. Chromium concentrations in finished water (ranging from 40 to 45 µg/L) are well below the Federal Maximum Contaminant Level for chromium (100 µg/L). However, the Tennessee Department of Health (TDH) has issued a report stating that a screening level of 30 µg/L is appropriate. Such a determination was beyond the control of Carrier, as was the

subsequent action taken by the Town of Collierville to completely shut down the well without regard to the levels of chromium in the finished water.

As you may recall, at the time of shutdown, Carrier and the Town were discussing means of keeping WP#2 operational to maintain containment, and these discussions are continuing. However, it is clear that the chromium contamination is the result of the actions of a third party source, which has in turn resulted in this most recent event, the shutdown of Water Plant #2. We appreciate the demands put upon EPA, but would ask the agency for all assistance to expedite measures to address this issue.

Implementation Schedule
The presence of chromium at WP#2 and the subsequent shut down by the Town may require Carrier to re-evaluate its remedial strategy, the first step of which will be a meeting with EPA representatives to discuss this situation further. Discussions with the EPA have this meeting tentatively scheduled for January 2004.

If you have any questions or concerns regarding our efforts to resolve this issue, please do not hesitate to contact me at 901/372-7962.

Respectfully submitted,

EnSafe Inc.

By: Lori Anne Goetz
Project Manager

Copy: Tim Overly, Collierville Public Works
Maude McGraw, Carrier Collierville
Bryan Kielbania, UTC Shared Services – Remediation

Appendix I
Schedule for Interim Actions at Water Plant #2 (EnSafe, June 2004)

ENSAFE

ENSAFE INC. ENVIRONMENTAL AND MANAGEMENT CONSULTANTS

5724 Summer Trees Drive • Memphis, Tennessee 38134 • Telephone 901-372-7962 • Facsimile 901-372-2454 • www.ensafe.com

June 30, 2004

Mr. Femi Akindele
Remedial Project Manager
EPA Region IV
Atlanta Federal Center
61 Forsyth Street S.W.
Atlanta, GA 30303-8960

Re: Carrier Air Conditioning Superfund Site
Collierville, Tennessee
Schedule for Interim Actions at Water Plant #2

Dear Mr. Akindele:

On behalf of United Technologies – Carrier Corporation, EnSafe Inc. is pleased to submit two copies of the enclosed *Schedule for Interim Actions at Water Plant #2* describing activities required to re-start pumping at Water Plant #2.

If you have any questions or comments, please do not hesitate to contact me at 901/372-7962 or lgoetz@ensafe.com.

Sincerely,

EnSafe Inc.

By: Lori Goetz

Enclosure

cc: Mr. Bryan Kielbania, UTC – Carrier (1copy)
Ms. Mary C. Johnson, USEPA (1copy)
Mr. Jordan English, TDEC (1copy)
Mr. Tim Overly, Town of Collierville (1copy)

SCHEDULE FOR INTERIM ACTIONS AT WATER PLANT #2

UTC — CARRIER AIR CONDITIONING COLLIERVILLE, TENNESSEE

EnSafe Project Number: 3133-075

Prepared for:

UTC — Carrier Corporation
97 South Byhalia Road
Collierville, Tennessee

Prepared by:

EnSafe Inc.
5724 Summer Trees Drive
Memphis, Tennessee 38134
(901) 372-7962
www.ensafe.com

June 30, 2004

Table of Contents

List of Figures

List of Attachments

1.0 Introduction

In accordance with Section XXII, Paragraph B of the Unilateral Administrative Order for Remedial Design and Remedial Action for the Carrier Air Conditioning Superfund Site in Collierville, Tennessee, United Technologies – Carrier Corporation (Carrier) is pleased to submit this schedule for Interim Actions at Water Plant #2 (WP#2).

On January 29, 2004 representatives from U.S. Environmental Protection Agency (USEPA), Tennessee Department of Environment and Conservation (TDEC) Division of Superfund (DSF), TDEC Division of Water Pollution Control (WPC), TDEC Division of Water Supply (DWS), the Town of Collierville, and Carrier met to discuss the impact of hexavalent chromium contamination at WP#2. As required by the Record of Decision (ROD), Carrier uses the WP#2 well field to contain trichloroethylene (TCE) contamination in the Memphis Sand aquifer. However, data obtained during 2002 and 2003 by the Town of Collierville and Carrier indicate that WP#2 has been impacted by a third-party chromium plume of unknown magnitude likely originating from the Smalley-Piper Site (USEPA ID No. TNN000407378). Figure 1 shows a conceptual rendering of the TCE and chromium plumes intersecting at WP#2; however, the age of the Smalley-Piper site and the groundwater velocities possible in the Memphis Sand suggest that this figure may actually underestimate the size of the chromium plume. USEPA is currently working with potentially responsible parties (PRPs) at the Smalley-Piper site on potential responses to chromium impacts.

Representatives at the January 29th meeting agreed that interim actions were required to modulate WP#2 flowrates and thereby minimize chromium impacts to WP#2 while still maintaining containment of the TCE plume. By letter dated April 29, 2004, USEPA has asked for a schedule of the activities Carrier anticipates for WP#2 interim actions.

2.0 Containment Assessment

As discussed in previous documents,[1] groundwater flow in the downtown Collierville area is generally to the northwest, at a gradient of approximately 0.0011 to 0.0014 feet per foot (ft/ft). Aquifer testing and subsequent model calibration suggested that transmissivities in the screened portion of the Memphis Sand were approximately 150,000 to 300,000 gallons per day per foot (gpd/ft) (20,100 to 40,100 square feet per day [ft^2/day]), within the range noted by previous Shelby County studies.[2] These transmissivity values were used to estimate a range of travel times for contaminant transport.

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1 *Technical Memorandum – Site Downgradient Monitoring Well Data Quality Assessment* (EnSafe, 1994), and *Memorandum – Carrier Collierville Verification Modeling* (EnSafe, 1997).

2 Parks and Carmichael, 1990.

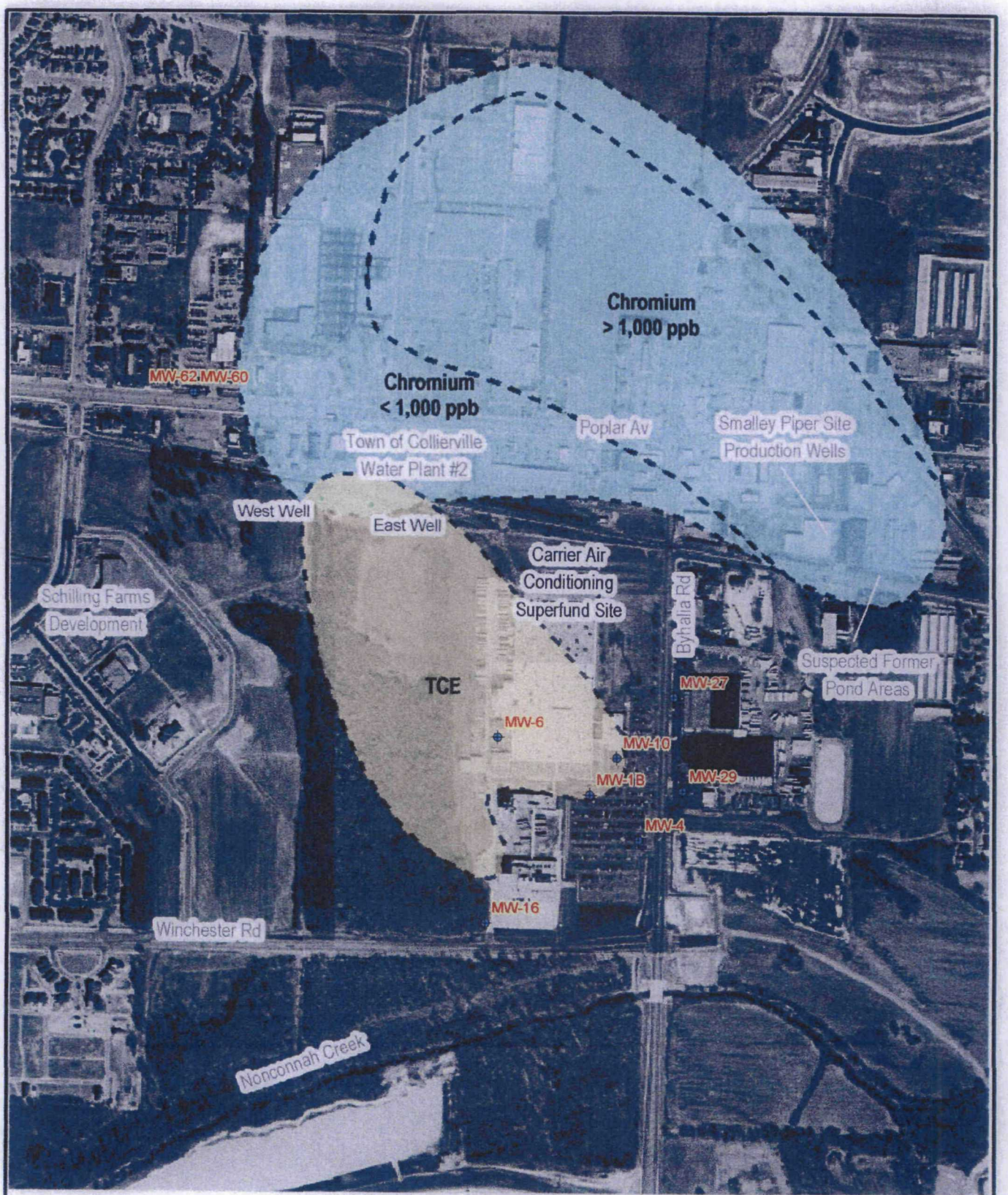

Figure 1
Conceptual TCE/Chromium Plume Map
Carrier Collierville Site
Collierville, Tennessee

Assuming an effective aquifer porosity of 0.30, and an aquifer thickness of 250 feet (the upper portion of the Memphis Sand), maximum groundwater velocities under ambient (non-pumping) conditions are

$$V = \frac{Ki}{n}$$

and

$$K = \frac{T}{B}$$

where

V = groundwater velocity (ft/day)
K = hydraulic conductivity (ft/day)
i = hydraulic gradient (ft/ft)
n = effective porosity (dimensionless)
T = aquifer transmissivity (ft^2/day)
B = aquifer thickness (ft)

Under high transmissivity/high gradient conditions, this results in a groundwater velocity of

$$V = \frac{(40{,}100\,ft^2/day)(0.0011\,ft/ft)}{(250\,ft)(0.3)} = 0.75\,ft/day = 270\,ft/yr$$

Under lower transmissivity/low gradient conditions,

$$V = \frac{(20{,}100\,ft^2/day)(0.0011)}{(250\,ft)(0.3)} = 0.29\,ft/day = 108\,ft/yr$$

Groundwater modeling presented in the 1997 Memorandum indicated that, under the 300,000 gpd/ft high transmissivity scenario when WP#2 operated both East and West wells concurrently at 375 gallons per minute (gpm) each, the composite capture zone extended approximately 350 feet downgradient of West Well. Similar analyses of West Well operating alone at 500 gpm also suggest between 250 and 300 feet of "backcapture" due to potentiometric surface reversal during pumping.

Using these data, groundwater present at the wellheads at shutdown on December 3, 2003 would migrate approximately 108 to 270 feet over the course of one year. However, re-start of the wellfield (specifically West Well) within this one year period would re-establish a capture zone that would prevent further migration downgradient.

Should re-start of WP#2 be delayed more than one year, some TCE may migrate beyond the back-capture point of the wellfield under high-transmissivity scenarios. Assuming re-start within two years, TCE may have migrated 200 to 300 feet beyond the back-capture point. The quantity of TCE beyond the capture zone would represent approximately 10% of the plume's current size, and would take approximately two to three years to reach downgradient assessment wells MW-60 and MW-62. It is expected that this TCE would attenuate through natural diffusion, dispersion, and adsorption processes due to the absence of significant organic matter within the aquifer to stimulate biodegradation.

Therefore, temporary cessation in pumping (i.e., 12 months) during analysis of the interim action will not substantially impact remedy performance. Assuming advective transport only, after one year of downtime, the volume of TCE migrating beyond the capture zone of the wellfield will increase approximately 10% per year until containment is effected.

3.0 Interim Actions – WP#2 Pumping Rates

As discussed in the January 29th meeting, extraction rates at WP#2 averaged approximately 1.1 million gallons per day (MGD) during the 1990s. To maintain these production rates and near-continuous pumping, water pressure demands throughout the Collierville potable system are first met through pumping at WP#2. However, pump upgrades in both wells during 2000 and 2001 increased WP#2 capacities to approximately 1.4 MGD: 510 gpm in East Well, and 450 gpm in West Well. A review of the capture zone generated under these conditions suggests that chromium has been drawn southwest, toward WP#2, under the higher flow rate conditions as shown in Figure 2; Attachment 1 presents the assumptions used to create these capture zone figures. Modeling results suggest chromium is present at higher concentrations in West Well due to the "wrap-around" effect, drawing water from the north and east.

To minimize the quantity of chromium drawn into WP#2, Carrier will operate the facility using only West Well. As shown in Figure 3, modeling results suggest that under this scenario there is less overlap between the capture zone and the known chromium plume because "wrap-around" conditions have been eliminated. However, absent concentration data, it is not possible to predict what concentrations would be present in West Well under short- or long-term operating conditions. Under this scenario, Carrier proposes to pump West Well at a flow rate of 400 to 500 gpm, the minimum flow rate required to establish a capture zone broad enough to capture the TCE plume.[3] Other flow rates, or a combination of East and West well pumping, will also be evaluated during the six-month interim action period to minimize chromium concentrations.

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[3] Operation at a lower flow rate may result in some TCE by-pass of the WP#2 system.

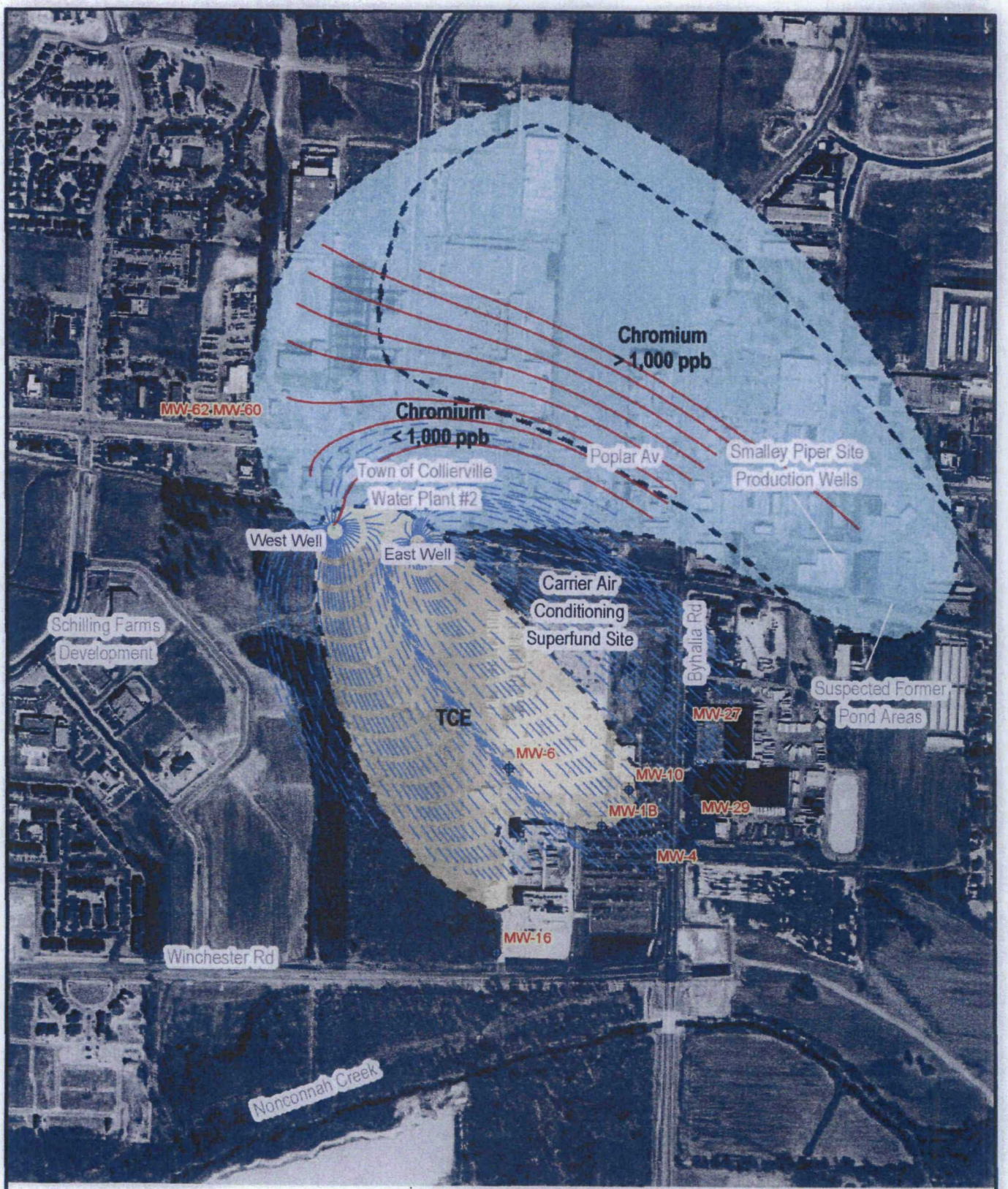

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Figure 2
WP #2 Preshutdown
Pumping Rates
Carrier Collierville Site
Collierville, Tennessee

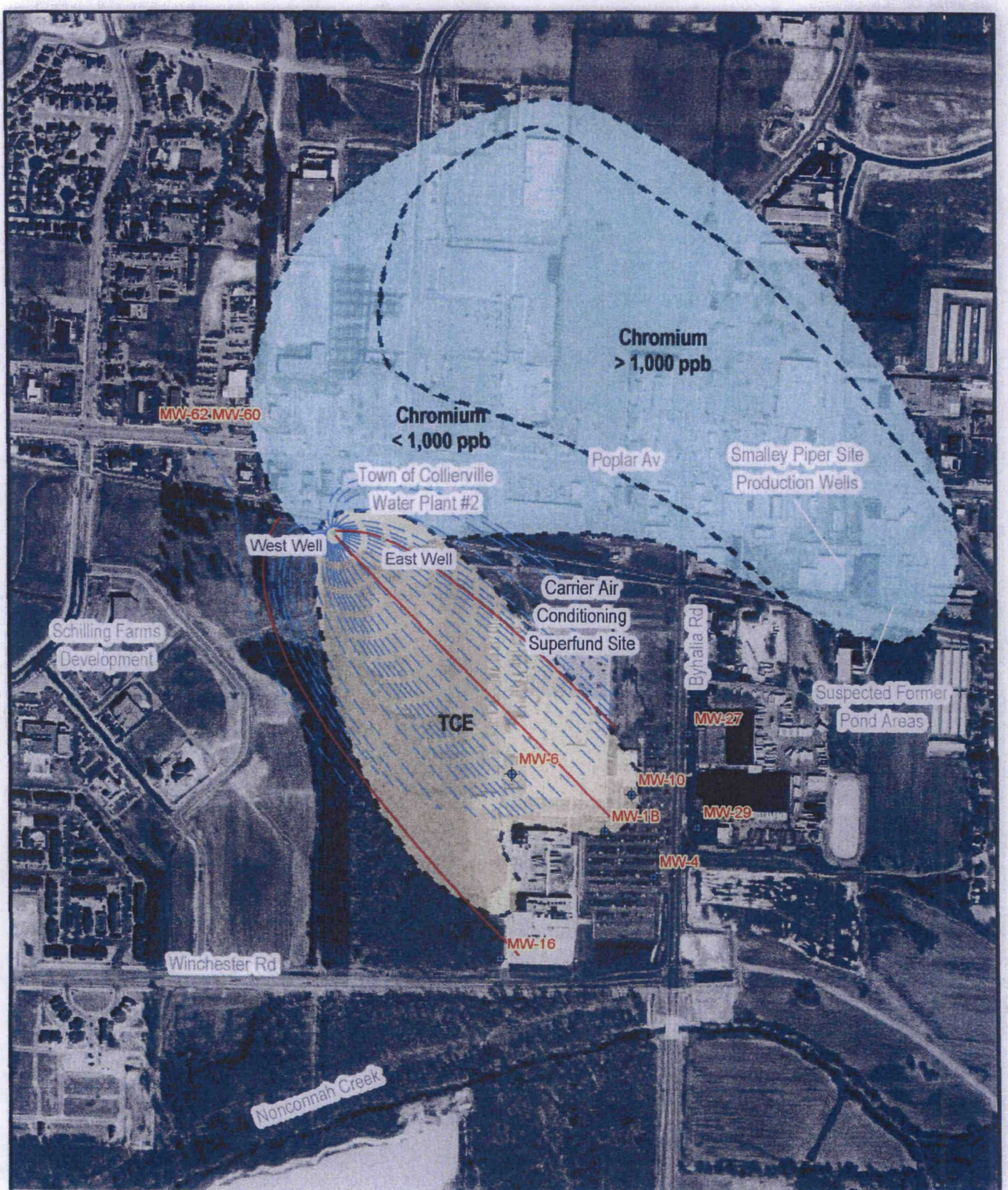

Figure 3
West Well Scenario
Carrier Collierville Site
Collierville, Tennessee

The following modifications to the WP#2 control system would be required:

- Remove control modifications installed during 2003 to ensure dual pumping.
- Bypass potable supply systems (fluoridation, chlorination), storage tank, and high service pumps.

These modifications are expected to be completed in August 2004.

4.0 Interim Actions – Discharge of Groundwater

During the six month operational test of WP#2, discharge of 0.7 MGD of extracted groundwater will be required. The Town of Collierville has indicated that during this trial period it will not accept extracted groundwater into its potable distribution system unless chromium concentrations are below detectable levels (assuming a detection limit of 10 micrograms per liter [µg/L]).

However, the Town of Collierville has agreed to allow a short-term discharge of WP#2 effluent to the Town's publicly owned treatment works (POTW). The agreement signed with the Town of Collierville (included as Attachment 2) specifies the following technical requirements:

- Limitation of maximum WP#2 discharge rates to no more than 500 gpm.
- Termination of WP#2 operation when combined POTW influent flow rates reach 2.85 MGD (95% of the design loading). Including the WP#2 discharge, this flow rate could be exceeded within 6 months due to projected growth rates and construction/development in Collierville.
- Temporary shutdown of WP#2 during high rainfall events due to direct inflow into the Town's sewers. Because infiltration is not a primary concern for POTW operations, the Town has indicated that WP#2 operations could resume within 24 hours of the rain event, once direct inflow ceases.
- Total chromium concentrations from WP#2 effluent must be less than 100 ppb.
- Flow, total chromium concentrations, and TCE shall be monitored and reported monthly.

Six-inch, double-walled discharge line will be installed below-grade from the air stripper treatment building at WP#2 to the Carrier facility, where it will connect with the facility's sewer discharge piping; modifications to the facility's sewer system will also be required to accommodate WP#2 flow rates. A totalizing flowmeter will be installed during construction of the discharge line and associated piping modifications.

Development of plans and specifications, as well as identification and selection of piping subcontractors, will occur during July 2004. Sewer discharge piping construction is expected to begin in early August. At this time, Carrier is working with the facility, which is undergoing an expansion (known as "Project Everest"), to coordinate the construction process, particularly with respect to the following issues:[4]

---

[4] A meeting with USEPA has been planned for July 22, 2004 in Atlanta to discuss the Project Everest expansion and its impacts on other elements of the site remedy.

- The facility's the existing sewer does not have the capacity to accommodate WP#2 flow rates. Because the facility is currently operational, modifications to the sewer line must be phased to prevent interruptions in service. Carrier will continue to examine construction phasing to determine project completion dates.
- Alternate routings for the WP#2 sewer connection may be possible, but may be precluded by expansion activities (e.g., expansion footprint, expansion schedule, etc.). Carrier will continue to examine the routing options with respect to the expansion footprint and project schedule.
- Sewer line modifications will be required adjacent to the main plant area (MPA) treatment system, and may encounter contaminated soil. Carrier is working with the facility to develop and manage excavation of contaminated soil in accordance with the site's Soil Management Plan.

The final completion date for the sewer discharge line, and the associated startup of WP#2, will be determined following resolution of the three issues identified above. Following completion, a memorandum discussing startup will be submitted to USEPA within 45 days of startup.

5.0 Interim Actions – Monitoring and Pilot Testing

As required by the agreement with the Town of Collierville, WP#2 will be monitored monthly for VOCs and chromium. Flow will be monitored continuously. These data will be reported to the Town as required by the sewer discharge permit. Additional sampling for hexavalent chromium will be performed bimonthly to gauge contaminant trends.

Pilot testing of a chromium treatment system for removal of hexavalent chromium will be performed during the interim action, once hexavalent chromium concentrations have stabilized. Additional water quality sampling may be performed as part of the pilot test. Treated water will be discharged to the Town of Collierville's POTW during the pilot test.

Progress reports will be submitted to USEPA bimonthly during interim actions.

At this time, several treatment options for hexavalent chromium are being evaluated; the preferred technology will be documented and a pilot test work plan outlined in a separate submittal to USEPA.

6.0 Long-Term Actions

As discussed in the conference call with USEPA and TDEC on June 23, 2004, the agreement with the Town of Collierville for discharge of WP#2 effluent will terminate once the POTW exceeds a predetermined capacity. Options for discharge will then be limited to discharge to surface water and potable use.

Surface Water NPDES Discharge

Carrier has pursued multiple conversations with TDEC-WPC regarding NPDES permitting of discharge to Nonconnah Creek, located approximately 0.25 miles south of WP#2. Because the Nonconnah Creek is a zero-flow stream during significant portions of the

year, discharge limits for chromium will be very low, approximately 11 µg/L, and therefore the extracted groundwater will likely require treatment prior to discharge. Alternate permitting strategies, such as a hydrologically controlled release (e.g., only allowing discharges when Nonconnah exhibits flow rates higher than a critical base flow) or site specific (toxicity-based) effluent discharge limits, are under consideration and will be discussed with TDEC. The technical and operational limitations of these strategies will be evaluated prior to permit application submittal.

During the six month interim-action period, Carrier will apply for an NPDES permit for discharge to the Nonconnah; analytical results obtained during interim operations and pilot study findings will be integrated into the permit application process.

Potable Use

The Town of Collierville has recently indicated that WP#2 is a critical part of its water supply system, and has expressed an interest in re-starting WP#2 for potable use following completion of interim actions. Two options are being considered for re-integration of WP#2 into the potable network:

- Treatment/removal of hexavalent chromium from WP#2 effluent prior to the Town's chlorination/fluoridation system. This option will be reviewed in conjunction with the pilot test, described in Section 5.0.
- Expansion of the WP#2 well field to provide additional capacity and, it is believed, dilution of the contamination (projected for growth in 2008 through 2012). This option will be reviewed to gauge the projected yield, optimal placement, installation depths, and conveyance structures required to return raw water to WP#2.

Under both scenarios, Carrier, the Town, TDEC-DWS, the Memphis-Shelby County Water Board, and ATSDR will need to determine an acceptable, quantifiable hexavalent chromium threshold and a suitable monitoring program for operations.[5]

In addition, Carrier will be working with the Town of Collierville to assess the potential for utilizing State of Tennessee economic development grant funds. These funds are available to address potable water supplies facing an immanent threat; minimum standards must be met for a municipality to qualify for funding. Grant funds may be applied to either a treatment system or to new wells, as described above.

These long-term actions will be pursued during the six month interim-action period.

[5] Previous communications with the Town indicated that it would not allow any detectable concentration of hexavalent chromium in potable water. However, as noted by USEPA and TDEC-DSF, ATSDR developed a guidance concentration of 30 µg/L for potable consumption of hexavalent chromium. Negotiations with multiple agencies will be required to determine a threshold concentration for WP#2 which will be acceptable to the community.

Attachment 1
Summary of Model Inputs

Attachment 1
Summary of Model Inputs

The CAPZONE and GW-Path analytical flow models were used to evaluate groundwater flow and theoretical capture zones within the Memphis Sand at Carrier Air Conditioning's Collierville Superfund Site. The models were used to perform the following tasks:

- Evaluate the extent of capture from the Town of Collierville's Water Plant #2 (WP#2) prior to shutdown in December 2003.
- Evaluate the extent of capture from WP#2 when only the West Well is pumping.

Model assumptions are discussed in the *Technical Memorandum – Site Downgradient Monitoring Well Data Quality Assessment* (EnSafe, 1994), Appendix D. These assumptions are still applicable to site conditions. No changes have been noted since the 1994 modeling assessment, or the subsequent review of the modeling documented in the *Memorandum – Carrier Collierville Verification Modeling* (EnSafe, 1997).

Because a recent static pumping surface was not available, capture zones were evaluated assuming a uniform hydraulic gradient consistent with prior surfaces, with groundwater flow to the northwest and a hydraulic gradient of 0.001 ft/ft.

Inputs into the models are described in the following tables for the two scenarios considered in the Schedule for Interim Actions. Model outputs are discussed in the text of the Schedule.

CAPZONE Input Parameters **WP#2 Pre-Shutdown Pumping Conditions**			
Parameter Group	**Parameter**	**Units**	**Memphis Sand Data**
Units	Input Units	Metric or American	American
Aquifer Parameters	Solution Method	None	Theis
	Transmissivity	Gpd/ft	300,000
	Storativity	Unitless	0.014
	Confined/Unconfined	None	Confined
	Saturated Thickness	Ft	200
Pumping/Injection Well Parameters	Number of Wells	None	4
	X,Y Coordinates	Ft	EW 8497, 10109 WW 8014, 10176 IWE 11465, 6809 IWW 11496, 6320
	Pumping/Injection Rate	Gpd	EW 720,000 WW 648,000 IWE -720,000 IWW -648,000
	Pumping Duration	Days	30
Grid Parameters	X,Y Start Coordinates	Ft	6500, 6000
	Nodes in X Direction	Unitless	56
	Increment in X Direction	Ft	100
	Nodes in Y Direction	Unitless	61
	Increment in Y Direction	Ft	100
Regional Piezometric Map/ Hydraulic Gradient	Regional Piezometric Surface Map	None	Not used.
	Uniform Hydraulic Gradient	Ft/ft	0.001
	Gradient Direction	None	Northwest

GW-Path Input Parameters **WP#2 Pre-Shutdown Pumping Conditions**			
Parameter Group	**Parameter**	**Units**	**Memphis Sand Data**
Flow Domain Parameters	Orientation	None	Horizontal
	Length Units	Meters or Feet	Feet
	Time Units	Seconds, Years, or Days	Years
	Plotfile Name	None	*Varied with scenario*
	Number of Nodes (X,Y)	None	56, 61
	X,Y Start Coordinates	Ft	6500, 6000
	Increment in X Direction	Ft	100
	Increment in Y Direction	Ft	100
Hydraulic Head File Name	File Name	Unitless	*Varied with scenario*
Pathline Analysis Parameters	Pathline Type/ Analysis Method	None	Reverse pathlines, circular origin from wellheads Forward pathlines, point origin, from MWs
	Start Coordinates	Ft	*Varied with scenario*
	Radius of Origin	Ft	50
	Number of Paths	None	30 to 50
	Total Time	Years	5 for reverse pathlines 10 for forward pathlines
	Min/Max Time Step	Years	0.01, 0.1
	Moves per Cell	none	2

CAPZONE Input Parameters **West Well Pumping Scenario**			
Parameter Group	**Parameter**	**Units**	**Memphis Sand Data**
Units	Input Units	Metric or American	American
Aquifer Parameters	Solution Method	None	Theis
	Transmissivity	Gpd/ft	300;000
	Storativity	Unitless	0.014
	Confined/Unconfined	None	Confined
	Saturated Thickness	Ft	200
Pumping/Injection Well Parameters	Number of Wells	None	4
	X,Y Coordinates	Ft	EW 8497, 10109 WW 8014, 10176 IWE 11465, 6809 IWW 11496, 6320
	Pumping/Injection Rate	Gpd	EW 0 WW 720,000 IWE -0 IWW -720,000
	Pumping Duration	Days	30
Grid Parameters	X,Y Start Coordinates	Ft	6500, 6000
	Nodes in X Direction	Unitless	56
	Increment in X Direction	Ft	100
	Nodes in Y Direction	Unitless	61
	Increment in Y Direction	Ft	100
Regional Piezometric Map/ Hydraulic Gradient	Regional Piezometric Surface Map	None	Not used.
	Uniform Hydraulic Gradient	Ft/ft	0.001
	Gradient Direction	None	Northwest

GW-Path Input Parameters **West Well Pumping Scenario**			
Parameter Group	**Parameter**	**Units**	**Memphis Sand Data**
Flow Domain Parameters	Orientation	None	Horizontal
	Length Units	Meters or Feet	Feet
	Time Units	Seconds, Years, or Days	Years
	Plotfile Name	None	*Varied with scenario*
	Number of Nodes (X,Y)	None	56, 61
	X,Y Start Coordinates	Ft	6500, 6000
	Increment in X Direction	Ft	100
	Increment in Y Direction	Ft	100
Hydraulic Head File Name	File Name	Unitless	*Varied with scenario*
Pathline Analysis Parameters	Pathline Type/ Analysis Method	None	Reverse pathlines, circular origin from wellheads Forward pathlines, point origin, from MWs
	Start Coordinates	Ft	*Varied with scenario*
	Radius of Origin	Ft	50
	Number of Paths	None	30 to 50
	Total Time	Years	5 for reverse pathlines 10 for forward pathlines
	Min/Max Time Step	Years	0.01, 0.1
	Moves per Cell	none	2

Attachment 2
Carrier-Town of Collierville Agreement for Interim Actions

INTERIM AGREEMENT

THIS INTERIM AGREEMENT (the "Agreement") is made and entered into as of the 14th day of June 2004, by and between CARRIER CORPORATION, a Delaware corporation, with its principal office at 1 Carrier Place, Farmington, Connecticut 06101 ("Carrier") and the TOWN OF COLLIERVILLE, a municipal corporation, existing under the law of the state of Tennessee with its principal offices located at 500 Poplar View Parkway, Collierville, Tennessee 38017 (the "Town").

WHEREAS, Carrier owns a parcel of land in Collierville, Tennessee, consisting of approximately one hundred thirty-five (135) acres on which it operates an air conditioner manufacturing plant ("Plant");

WHEREAS, the Plant has been listed by the United States Environmental Protection Agency ("EPA") as a site requiring remedial action under Section 105 of the Comprehensive Environmental Response Compensation and Liability Act ("CERCLA");

WHEREAS, on February 19, 1993, EPA Region IV issued a Unilateral Administrative Order (the "UAO") to Carrier to conduct appropriate remediation of ground water contamination in the area of the Plant;

WHEREAS, the Town has cooperated with Carrier in the implementation of the said remedial action required of Carrier by entering into an agreement dated April 12, 1996, pursuant to which the Town agreed to operate its Water Plant No. 2, which then supplied a portion of the Town's potable water requirements, at 7.5 million gallons per week, in order to help facilitate compliance by Carrier with the UAO (the "1996 Agreement");

WHEREAS, as a result of unexpected circumstances beyond the Town's control, *i.e.*, detection of chromium in water from wells servicing Water Plant No. 2, the Town discontinued operation of Water Plant No. 2;

WHEREAS, although the parties disagree concerning the scope of their respective obligations under the 1996 Agreement, the parties have determined that an appropriate interim measure by which the Town can assist Carrier in complying with the UAO is for the Town to resume operation of Water Plant No. 2 for the purpose of delivering approximately five hundred (500) gallons per minute of water during the term of this Agreement to Carrier for discharge to the Town's publicly owned treatment works located at 1500 Wolf River Boulevard, Collierville, Tennessee 38107 (the "POTW") pursuant to the provisions of a treatment permit (the "Permit") granted by the Town; and

WHEREAS, Carrier and the Town have conferred with EPA Region IV and with the Tennessee Department of Environment and Conservation regarding the terms of this Agreement.

NOW, THEREFORE, in consideration of the premises and the mutual covenants contained herein, the parties agree as follows:

1. Term. The term of this Agreement shall be for a period from its effective date, until such date on which the total volume of discharges to the POTW shall reach ninety-five percent

(95%) of the POTW's capacity on a regular and recurring basis. The Town further reserves the right to temporarily discontinue well operation or reduce the flow from Water Plant No. 2 during periods when storm water from rainfall events threatens to exceed the capacity of the POTW, or if required in connection with maintenance of the POTW to assure its compliance with the Town's NPDES permit, or in the event any of the conditions of Exhibit A attached hereto shall not have been satisfied. The Town shall give notice to Carrier's designated representative no later than twenty-four (24) hours after any discontinuance or reduction of discharge of water from Water Plant No. 2 pursuant to, and during the term of, this Agreement.

2. Operation of Water Plant No. 2. During the term of this Agreement, subject to Carrier's compliance with the conditions stated in Exhibit A to this Agreement, the Town shall continue to operate and maintain Water Plant No. 2 at its sole cost and expense, and shall provide any personnel necessary to operate Water Plant No. 2.

3. Volume. The maximum allowable flow from Water Plant No. 2 to be discharged at the POTW shall be five hundred (500) GPM, not to exceed .72 MGD.

4. Additional Terms and Conditions. In addition to Carrier's compliance with the terms and conditions of the Permit, Carrier shall also comply with the additional terms and conditions set forth in Exhibit A to this Agreement.

5. 1996 Agreement. The Town will resume operation of Water Plant No. 2 for the purpose of supplying the Town's partial potable water requirements in accordance with the terms of the 1996 Agreement as soon as practicable following receipt of data demonstrating to the Town's reasonable satisfaction that no chromium has been detected in the finished water pumped from Water Plant No. 2 at a detection limit of ten (10) parts per billion for two (2) consecutive months; provided, however, the Town will reserve the right to suspend operation of Water Plant No. 2 in the event that chromium is subsequently detected in the finished water at a level in excess of the aforesaid detection limit. Carrier, at its cost, shall reinstall such piping and equipment as shall be necessary for the Town to resume operation of Water Plant No. 2 in accordance with the terms of the 1996 Agreement.

6. Notices. Any notices required under this Agreement shall be given by telephone and/or electronic mail, followed by confirming letter sent by Federal Express or similar overnight courier service as follows:

If to Carrier:

Bryan Kielbania, Engineer
United Technologies Corporation
One Financial Plaza
MS 507-00
Hartford, Connecticut 06101
(860) 728-6503 – Telephone
(860) 660-0234 -- Facsimile

If to Town:

Timothy Overly, Director of Public Utilities
Public Services Department
City of Collierville
500 Keough
Collierville, Tennessee 38017
(901) 853-3215 – Telephone
(901) 853-3218 -- Facsimile

With a copy to:

William Kilp, Director
Public Services Department
City of Collierville
500 Keough
Collierville, Tennessee 38017
(901) 853-3215 – Telephone
(901) 853-3218 -- Facsimile

7. No Waiver. Nothing contained in this Agreement shall be deemed to waive the rights or obligations of either of the parties under the 1996 Agreement or under that certain Lease Agreement dated as of the 1st day of March, 1967, as subsequently amended by Addendum dated the 1st day of April, 1982, by and between the Town, as Lessor, and Carrier, as Lessee.

IN WITNESS WHEREOF, this Agreement has been executed on behalf of the parties by their respective, duly authorized representative as of the date first above written.

CARRIER CORPORATION

By: William F. Leiker
Attorney-in-Fact

TOWN OF COLLIERVILLE

By: Linda Kerley
Mayor

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Exhibit A

TOWN OF COLLIERVILLE
CONDITIONS FOR CARRIER DISCHARGE OF WEST WELL WATER PLANT NO. 2
TO THE NORTHWEST TREATMENT PLANT

1. The concentration of total chromium in the water discharged from Water Plant No. 2 shall not exceed 100 ppb (micrograms per liter) at 500 gpm of flow. When total chromium concentrations exceed 100 ppb, the discharge shall be discontinued or flows reduced to ensure no more than 1 lb per day of chromium is discharged into the POTW.

2. The discharge shall come directly from the stripper room discharge piping, bypassing the storage tank, in accordance with such plans and system submitted by Carrier to the Town and approved by the Town.

3. Carrier shall be issued a pretreatment permit for the discharge of water from Water Plant No. 2. Carrier shall monitor for total chromium and TCE in the finished water and report the results monthly to the Town.

4. Carrier shall be responsible for any design and construction costs associated with the rerouting of the water from Water Plant No. 2 to the POTW. Carrier shall also be responsible for carrying out flow tests to confirm that the current pumps can adequately handle the desired volume of flow to the POTW.

5. Maintenance and capital replacements of improvements constructed by Carrier hereunder, as well as maintenance and capital replacement costs associated with the stripper towers referred to in the 1996 Agreement, as necessary to insure that the water discharged to the POTW is in compliance with National Primary Drinking Water Standards for volatile organic compounds, shall be the responsibility of Carrier.

6. Carrier shall pay the Town's current cost per kgals ($.77 per 1,000 gallons), together with any future system-wide treatment rate increases, for discharge to the POTW during the term of the Agreement, provided that in no event will the aforesaid discharge fee payable by Carrier be increased prior to January 1, 2005. Flow shall be measured by a flow meter in the discharge piping to the sewer to be installed by Carrier.

Appendix J
2004 Carrier-Town of Collierville Agreement for Interim Operations

INTERIM AGREEMENT

THIS INTERIM AGREEMENT (the "Agreement") is made and entered into as of the 14th day of June 2004, by and between CARRIER CORPORATION, a Delaware corporation, with its principal office at 1 Carrier Place, Farmington, Connecticut 06101 ("Carrier") and the TOWN OF COLLIERVILLE, a municipal corporation, existing under the law of the state of Tennessee with its principal offices located at 500 Poplar View Parkway, Collierville, Tennessee 38017 (the "Town").

WHEREAS, Carrier owns a parcel of land in Collierville, Tennessee, consisting of approximately one hundred thirty-five (135) acres on which it operates an air conditioner manufacturing plant ("Plant");

WHEREAS, the Plant has been listed by the United States Environmental Protection Agency ("EPA") as a site requiring remedial action under Section 105 of the Comprehensive Environmental Response Compensation and Liability Act ("CERCLA");

WHEREAS, on February 19, 1993, EPA Region IV issued a Unilateral Administrative Order (the "UAO") to Carrier to conduct appropriate remediation of ground water contamination in the area of the Plant;

WHEREAS, the Town has cooperated with Carrier in the implementation of the said remedial action required of Carrier by entering into an agreement dated April 12, 1996, pursuant to which the Town agreed to operate its Water Plant No. 2, which then supplied a portion of the Town's potable water requirements, at 7.5 million gallons per week, in order to help facilitate compliance by Carrier with the UAO (the "1996 Agreement");

WHEREAS, as a result of unexpected circumstances beyond the Town's control, *i.e.*, detection of chromium in water from wells servicing Water Plant No. 2, the Town discontinued operation of Water Plant No. 2;

WHEREAS, although the parties disagree concerning the scope of their respective obligations under the 1996 Agreement, the parties have determined that an appropriate interim measure by which the Town can assist Carrier in complying with the UAO is for the Town to resume operation of Water Plant No. 2 for the purpose of delivering approximately five hundred (500) gallons per minute of water during the term of this Agreement to Carrier for discharge to the Town's publicly owned treatment works located at 1500 Wolf River Boulevard, Collierville, Tennessee 38107 (the "POTW") pursuant to the provisions of a treatment permit (the "Permit") granted by the Town; and

WHEREAS, Carrier and the Town have conferred with EPA Region IV and with the Tennessee Department of Environment and Conservation regarding the terms of this Agreement.

NOW, THEREFORE, in consideration of the premises and the mutual covenants contained herein, the parties agree as follows:

1. Term. The term of this Agreement shall be for a period from its effective date, until such date on which the total volume of discharges to the POTW shall reach ninety-five percent

(95%) of the POTW's capacity on a regular and recurring basis. The Town further reserves the right to temporarily discontinue well operation or reduce the flow from Water Plant No. 2 during periods when storm water from rainfall events threatens to exceed the capacity of the POTW, or if required in connection with maintenance of the POTW to assure its compliance with the Town's NPDES permit, or in the event any of the conditions of Exhibit A attached hereto shall not have been satisfied. The Town shall give notice to Carrier's designated representative no later than twenty-four (24) hours after any discontinuance or reduction of discharge of water from Water Plant No. 2 pursuant to, and during the term of, this Agreement.

2. Operation of Water Plant No. 2. During the term of this Agreement, subject to Carrier's compliance with the conditions stated in Exhibit A to this Agreement, the Town shall continue to operate and maintain Water Plant No. 2 at its sole cost and expense, and shall provide any personnel necessary to operate Water Plant No. 2.

3. Volume. The maximum allowable flow from Water Plant No. 2 to be discharged at the POTW shall be five hundred (500) GPM, not to exceed .72 MGD.

4. Additional Terms and Conditions. In addition to Carrier's compliance with the terms and conditions of the Permit, Carrier shall also comply with the additional terms and conditions set forth in Exhibit A to this Agreement.

5. 1996 Agreement. The Town will resume operation of Water Plant No. 2 for the purpose of supplying the Town's partial potable water requirements in accordance with the terms of the 1996 Agreement as soon as practicable following receipt of data demonstrating to the Town's reasonable satisfaction that no chromium has been detected in the finished water pumped from Water Plant No. 2 at a detection limit of ten (10) parts per billion for two (2) consecutive months; provided, however, the Town will reserve the right to suspend operation of Water Plant No. 2 in the event that chromium is subsequently detected in the finished water at a level in excess of the aforesaid detection limit. Carrier, at its cost, shall reinstall such piping and equipment as shall be necessary for the Town to resume operation of Water Plant No. 2 in accordance with the terms of the 1996 Agreement.

6. Notices. Any notices required under this Agreement shall be given by telephone and/or electronic mail, followed by confirming letter sent by Federal Express or similar overnight courier service as follows:

If to Carrier:

Bryan Kielbania, Engineer
United Technologies Corporation
One Financial Plaza
MS 507-00
Hartford, Connecticut 06101
(860) 728-6503 – Telephone
(860) 660-0234 -- Facsimile

If to Town:

Timothy Overly, Director of Public Utilities
Public Services Department
City of Collierville
500 Keough
Collierville, Tennessee 38017
(901) 853-3215 – Telephone
(901) 853-3218 – Facsimile

With a copy to:

William Kilp, Director
Public Services Department
City of Collierville
500 Keough
Collierville, Tennessee 38017
(901) 853-3215 – Telephone
(901) 853-3218 – Facsimile

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IN WITNESS WHEREOF, this Agreement has been executed on behalf of the parties by their respective, duly authorized representative as of the date first above written.

CARRIER CORPORATION

By: William F. Leiter
Attorney-in-Fact

TOWN OF COLLIERVILLE

By: Linda Kerley
Mayor

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Exhibit A

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CONDITIONS FOR CARRIER DISCHARGE OF WEST WELL WATER PLANT NO. 2 TO THE NORTHWEST TREATMENT PLANT

1. The concentration of total chromium in the water discharged from Water Plant No. 2 shall not exceed 100 ppb (micrograms per liter) at 500 gpm of flow. When total chromium concentrations exceed 100 ppb, the discharge shall be discontinued or flows reduced to ensure no more than 1 lb per day of chromium is discharged into the POTW.

2. The discharge shall come directly from the stripper room discharge piping, bypassing the storage tank, in accordance with such plans and system submitted by Carrier to the Town and approved by the Town.

3. Carrier shall be issued a pretreatment permit for the discharge of water from Water Plant No. 2. Carrier shall monitor for total chromium and TCE in the finished water and report the results monthly to the Town.

4. Carrier shall be responsible for any design and construction costs associated with the rerouting of the water from Water Plant No. 2 to the POTW. Carrier shall also be responsible for carrying out flow tests to confirm that the current pumps can adequately handle the desired volume of flow to the POTW.

5. Maintenance and capital replacements of improvements constructed by Carrier hereunder, as well as maintenance and capital replacement costs associated with the stripper towers referred to in the 1996 Agreement, as necessary to insure that the water discharged to the POTW is in compliance with National Primary Drinking Water Standards for volatile organic compounds, shall be the responsibility of Carrier.

6. Carrier shall pay the Town's current cost per kgals ($.77 per 1,000 gallons), together with any future system-wide treatment rate increases, for discharge to the POTW during the term of the Agreement, provided that in no event will the aforesaid discharge fee payable by Carrier be increased prior to January 1, 2005. Flow shall be measured by a flow meter in the discharge piping to the sewer to be installed by Carrier.

Appendix K
November 8, 2004 Correspondence
Restart of WP#2

XPERT DESIGN AND DIAGNOSTICS, LLC

22 MARIN WAY, STRATHAM, NH 03885 TEL: (603) 778-1100, FAX: (603) 778-2121

November 8, 2004

Mr. Femi Akindele
Remedial Project Manager
USEPA Region 4
61 Forsyth Street, S.W.
Atlanta, GA 30303-8960

RE: Notification of Water Plant No 2 Discharge to POTW
Carrier Air Conditioning Superfund Site, Collierville, Tennessee
EPA ID: TND04406222
XDD Project No. 73271

Dear Femi:

On behalf of Carrier Air Conditioning and United Technologies Corporation (UTC), Xpert Design and Diagnostics, LLC (XDD) is providing this a notification that the Town of Collierville's water plant No. 2 (WP2) has been restarted. Limited operation of WP2 occurred on October 29th, November 4th, and November 5, 2004 to evaluate the impact of its discharge to the POTW. As of November 8, 2004, WP2 is operating continuously from the west well at a rate of 500 gallons per minute discharging into the Town's sewer system on Byhalia road.

Sampling of this discharge will be weekly for the first month of operation and bimonthly thereafter. The sampled water will be analyzed for volatile organic compounds, total and hexavalent chromium.

Please contact me if you have any questions regarding this letter.

Sincerely,

Bruce L. Cliff, P.E.
Senior Project Manager

copy: Bryan Kielbania – UTC
Jordon English – TDEC Superfund
Tim Overly – Town of Collierville DPW
Edward X. Droste - XDD
Lori Goetz - EnSafe
Mark Allen - SAS
Pamela K. Elkow - Robinson & Cole